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**PUBLIC HEALTH**

PAPERS AND REPORTS

VOLUME XII

PRESENTED AT THE FOURTEENTH ANNUAL MEETING OF THE

**American Public Health Association**

TORONTO, ONT., CANADA, OCTOBER 5-8

1886

WITH AN ABSTRACT OF THE RECORD OF PROCEEDINGS

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## NOTE BY THE SECRETARY.

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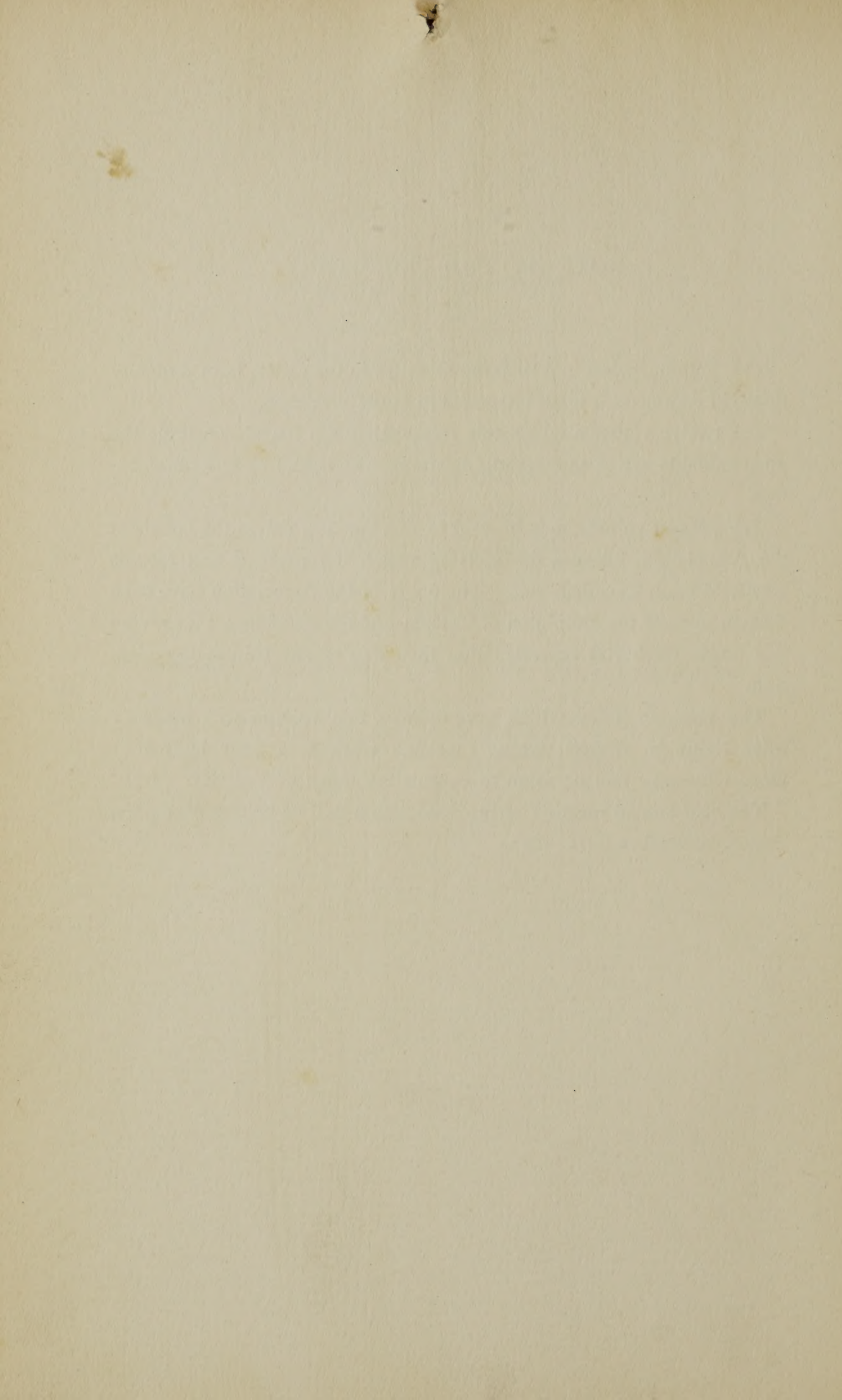
This volume, while not so large as some in the series, is of a quality that will commend it to all interested in sanitary science.

The twelve volumes which this Association has issued constitute the most valuable set of sanitary publications ever issued by any organization.

The present volume may be said to mark a new era in the annals of the Association, because the meeting which it represents and records was held upon Canadian soil. The doors of the Association have been thrown open to the Dominion of Canada and the provinces, thus giving it a larger territorial representation than that of any similar organization.

The valuable index which accompanies this volume was made by Miss Nellie S. Abbott, whose thorough work is already known by those who have had occasion to consult the index of Vol. XI.

The next annual meeting of the Association will be held at Memphis, Tenn., November 8-11, 1887.





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## I.

### THE PRESIDENT'S ADDRESS.

BY HENRY P. WALCOTT, M. D.,  
*President State Board of Health, Cambridge, Mass.*

MEMBERS OF THE AMERICAN PUBLIC HEALTH ASSOCIATION:—This fourteenth annual meeting will fill an important chapter in the history of the Association, which is here for the first time assembled in a city beyond the limits of the United States.

But fortunately our wise founders included a continent in their title; and the questions submitted to us for deliberation and answer are beyond the limitations set by country, race, education, politics, or religion, except so far as certain diseases may be modified by climatic and local conditions, or by degrees of inherited and acquired immunity,—questions that must be answered, whether asked north of the St. Lawrence and the great lakes, south of the Rio Grande, or in the great country lying between them.

The great significance of this meeting does not rest alone in the fact that carefully prepared and able papers will be read here upon important topics, that instructive debates will follow, that the conclusions arrived at will have all the authority which this assembly of those most prominent in sanitary science on this side of the Atlantic can give to them. Although it cannot be expected that any one of the great problems in preventive medicine will receive a satisfactory solution in the short space of time given to our work here, yet a popular interest, intelligent and active, can be created,—experience in other cities has taught us this,—and the workers in our cause can form that valuable acquaintance with their fellows, which, in an Association like this, must lead to the mutual confidence which is essential to the successful working of the various public and private sanitary organizations of the continent.

The original inhabitants of this country seem to have made this city ready for us;—they named the spot Toronto, or “a place of meeting.”

Let us accept the omen.

In the pages of a history which the genius of the author has made as familiar here as it is in the land of his birth, you may read, that, in the year 1751, Piquet, the so-called “Apostle of the Iroquois,” coasting the northern shore of Lake Ontario, reached the new fort of Toronto, and made this record of his experience: “The wine here is of the best;

there is nothing wanting in this fort; everything is abundant, fine, and good." One hundred and thirty-five years do not seem to have changed these cheerful characteristics of the spot.

This occasion, however, brings also to our minds those whom we shall not again see at our meetings; their names can only be recalled here, while a standing committee of this body will see to it that a fitting record of their lives and services shall be entered on the public records of the Association.

Drs. Austin Flint and Frank H. Hamilton, through long lives of distinguished success in their respective branches of medical practice, were also teachers and writers who have made for themselves a permanent place in medical literature. Dr. Flint contributed several valuable papers to the earlier volumes of our transactions.

E. S. Chesbrough, C.E., a man of great prominence in his profession, was largely concerned in measures for the better water-supply and improved sewerage of many of the most important cities of the country. Possessed of great attainments, he will be long remembered by his associates for that attractive modesty which in his case sprang not from want of resolution or lack of knowledge, but from a truth so pure that it needed not strong statement nor aggressive self-assertion.

Professor William R. Nichols died at an early age of a lingering disease, which, though it had imposed certain physical limitations upon his work, had yet never diminished his scientific ardor. He brought chemistry to the service of the public health, allying originality to good sense, and the spirit of research to critical sagacity.

In the thoughts of their self-devoted lives, and in the confidence justly drawn from the results which they have accomplished, we may find support for a belief in the reality and certainty of preventive medicine; doubted by a class ever present in all communities, who are animated by the mental bias peculiar to our times; to whose minds a doubt seems to offer a certain degree of distinction not so easily obtained by an agreement with the generally accepted views on any subject; they have done but little themselves, though their noisy declamation draws the usual crowd, reënforced too often by a more attractive class of minds,—those given to speculation and literary pursuits, in whom the knowledge of ideas is greater than the knowledge of things. This state of mental unrest does not appear alone in matters of speculation, but has had its influence upon entities, as serious as the contagion of the eruptive fevers. In one of the older states of the Union, a child sick with scarlet fever had been given by the parents into the charge of a woman styling herself a Christian scientist. The city physician of the place became aware of the case in the third week of the disease, identified the malady, and satisfied himself that many other children had probably been affected from this source. The health regulations required notification of diseases of this class, and the woman was called to account. She met the threats of the law with the calm declaration that she was quite ignorant of the nature of the disease—that was not essential; for the same divine



power which brought the child safely through the attack, would as surely destroy the contagion of it.

There is no evidence that the believers in Christian science were dissatisfied with this statement.

It is proper, on an occasion like this, to ask ourselves, What claims may we make for preventive medicine, and what expectations are we justified in forming for its future?

This self-examination is rendered all the more necessary by the excessive zeal of the advocates of state control in medicine, who advance claims certainly not fully justified by the present position of sanitary science. Were we to believe some of these too earnest friends, the establishment of a national, state, or local board of health is the one thing necessary for the speedy reducing of the death rate, and for the removal of all conditions injurious to the public health. How all this is to be accomplished does not appear.

On the other hand are Mr. Herbert Spencer and some of his followers, who maintain that the diminution of the death-rate by the removal of any causes unfavorable to health, and the consequent increase in population, are followed by a more intense action of certain other elements not removed, and the old proportion is again established. In illustration of this position, weight is given to two considerations: first, that, by the removal of injurious influences, weaker individuals are preserved who would otherwise have perished, but who now propagate a permanently enfeebled race, not even able to withstand the less injurious influences which are prevalent; and so the mortality rate rises again to the old standard. Secondly, that the expense attending this removal of noxious influences involves a waste of force, which reduces the powers of resistance; and the balance is once more restored. With some truth, the errors in the two statements are apparent to him who is, by his occupation, familiar with disease.

The first proposition is based upon the assumption that the weaker lives are those most likely to be removed by unsanitary surroundings. In one sense this is true, if by a weak life is understood that life which is unable to resist some special noxious influence. This, however, is a mere juggling with words. It is not correct to assume that this susceptibility carries with it any loss of capacity to do the hard work of life through more than the average term of years. Typhoid fever, for instance, prevails during the most vigorous period of life; and there is no evidence that the individual protected from death by this disease is a more probable victim of some other malady, than one who has survived an attack of typhoid fever. The great mortality of the first year of life does not fall upon the weak lives alone, but rather upon the unprotected infants of the large cities, carelessly nourished or imperfectly cared for. If we could improve the conditions of lodging, food, and clothing among the poorer classes, no one could fairly claim that the lives so saved would become the defective adults of a coming generation: on the other hand, we should be justified in the expectation of saving a number

of lives, and those the strongest; the weakest we should lose as before. Mr. Spencer's view is that of the layman, not of him who deals with the varied forms of disease.

Unfortunately man's life is hedged about by many injurious influences, which we do not understand accurately, and which we cannot remove.

In the experience of some of our best guarded communities, there seems to have been no substantial advance made in the prevention of diphtheria, for instance: first noted as a cause of death in Massachusetts in the Registration Report of the year 1858, it caused, in the year 1863, 8.17 per cent. of all the deaths of that year. In 1872 the percentage fell to 2.16 per cent.; rapidly increasing, it rose in 1877 to 10.43 per cent.; and since that year it has steadily fallen to 3.98 per cent. for the last registration year, 1885. In several cities of the same state, epidemics of scarlet fever, as well as of diphtheria, have been recorded, under conditions that can leave no doubt as to the accuracy of the observation; which have at some seasons shown a marked activity in well drained and otherwise well cared for districts, and have had but a limited development in other portions of the same city, where drainage is defective and crowding marked. With regard to diphtheria, then, Mr. Spencer's warning not to expect too much of preventive measures should be borne in mind.

It is possible to recognize in it certain distinct features. It is contagious, and by state regulation we may control many of the conditions of infection. How much more do we know?

Let me not be held to be a defender, in making this statement, of a lack of proper drainage, of crowded tenements, or of the dirt of neglected dwellings. It is established, beyond the shadow of a doubt, that life in the midst of these surroundings has a shorter duration; and though one or two of the infectious diseases may at times be less prevalent or fatal, still there are very many more from which the poor and neglected suffer in a larger proportion than their better cared for neighbors.

Upon the second point argued by Mr. Spencer,—the cost of protective measures,—it is assumed by the philosopher that the great majority of the population earn only enough to support life. Wherever else that condition may exist, it is surely not here to the extent indicated. Each country must consider the question with reference to itself alone; the determination of it belongs more to the statesman than to the sanitarian. Admitting, as we probably should, that questions of taxation and wages are not within the province of the sanitary authority, that legislation upon the price of labor is generally mischievous, we may still ask our law-givers whether it were not well, before wages are left to find their own level in the fierce struggle of unrestricted competition, that law should secure, beyond hazard, for the ignorant and unprotected poor, an atmosphere not laden with noxious effluvia, a pure public water-supply, food and drugs free from dangerous or fraudulent adulteration, and lastly, a tenement to live in, the conditions of which shall not be as fatal to morality as they are to health. There can be nothing more depressing than



a visit to some of the tenement-houses of our large cities. A whole family may be found crowded, in a state of brutal filthiness, into a single room, with a necessary absence of all the things essential to health, cleanliness, or decency. Every law of right living is so neglected that a feeble generation must be followed by one more feeble, until asylums and public institutions, supported at a general charge, for the miserable victims of a state of things which they did not make, and cannot always unmake, shall teach again, perhaps too late, that public health is public wealth.

However, no country has as yet been ruined by expenses incurred in protecting the public health. But health is sometimes too precious a commodity for the particular market in which we are compelled to make our purchases. The statesman and the sanitarian must act in harmony ; and we shall not find the legislator in advance of the views generally held by the people at large as to the value of preventive measures. It is only by the untiring, patient effort of the earnest men who have made this and many another sanitary organization famous, that the better instruction of the people can be brought about, which never yet failed of representation and authority in legislative chambers.

It is generally claimed that vital statistics must answer the question as to the certainties of state medicine. To a limited extent they do, as in the case of the diminution of typhoid fever in consequence of purer water supplies and better sewerage. They do not, however, furnish this ready answer in all cases : like the possible work of art in the unhewn block of marble, the real meaning can only be embodied out of them by the hand of the master. The difficulties of interpreting vital statistics, for the purposes of the sanitarian, are by no means small. We have not been gathering them for periods of time sufficiently long, over territories sufficiently wide, to justify definite conclusions upon a large number of public health questions.

A marked instance of the fallacy of insufficient observation is offered by the bubonic plague and the circumstances of its final disappearance from England. With a history reaching back to a period before the beginning of the Christian era, this was the one great epidemic of the middle ages, traversing the whole known world, causing, as estimated by Hecker, in the invasion of the fourteenth century, the loss of twenty-five million human beings,—a quarter part of the inhabitants of this planet. Political and social order disappeared in its shadow ; chroniclers, doctors, and poets decked out their descriptions of it with all the horrors of fact and all the terrors of imagination. Appearing again and again in the following centuries, and in the same extent and frequency through the first two thirds of the seventeenth century, until that evening of the 7th of June, 1665, when Mr. Samuel Pepys, for the first time, saw two or three houses in Drury Lane marked with the red cross, and the words "Lord have mercy upon us;" and the sight, so he writes in that wonderful diary, made him feel very ill at ease. It is a matter of interest to us, as sanitarians, that this wise man, later on president of the Royal

Society, proceeded to practise such preventive measures as were then usual. He bought some roll tobacco to smell and chew. As he courageously remained at his post of duty in the city during the worst of the terrible visitation, and escaped the disease, shall we assume the remedy to have been efficacious?

From this time on, the pestilence raged with such fury that one hundred thousand persons perished in London. A year later came the great fire, which destroyed a large portion of the city. A few years more, and London, arising from the ashes, had found her purification in fire, for the bubonic pest never appeared again within her walls. This conclusion seems to be correct; it has been, and is, one of the commonplaces of the writer and lecturer on hygiene; it is possible, even, that it has been used before this Association; and yet, he who studies that magnificent monument of a single man's industry and learning,—the "*Historisch-Geographische Pathologie*" of Hirsch,—will know that this disease never again appeared in any portion of the British Islands; had, in fact, been seen in Ireland for the last time in 1650; was never noticed in Holland or the Low Countries after the mild epidemic of 1669; and, with the exception of Provence, France was free from the pestilence also after 1666. The retreat had already begun when London was burning, and western Europe, by no effort of her own, was at last free from the most fatal epidemic of modern history. The pest still lives in its Asiatic home. Whether it may ever again prevail in Europe,—the limited epidemic of Astrachan, in the winter of 1878-'79, shows that it is possible,—who can answer? We know as little of its going as we do of its coming.

As another instance of hasty conclusions from insufficient observation, what is there more instructive than the history of scarlet fever? Sydenham declared it to be only the name of a disease. The great clinical teacher of Dublin, Graves, places on record the fact, that in the years from 1800 to 1804 scarlatina was prevalent in Ireland, and very fatal, while in the succeeding years, down to 1831, the disease had so far changed its character that physicians in large practice could say that they had never seen a fatal case. Therefore, medical men were led to believe that this change was the result of better treatment, the Brunonian school and the influence of its teachings being held responsible for the fatality of the earlier epidemics. This was taught in the schools, and scarlet fever was claimed as one of the triumphs of a newer method of cure, which allowed the use of the lancet, and of cooling and aperient medicines.

In 1831, however, an outbreak of scarlet fever took place, which had all the characters and all the malignancy of the earlier epidemics, a disease more intractable than typhus or cholera.

So far from discouraging us, should not such variations as these lead us to greater industry in investigating all the conditions under which a particulate contagion may give rise to such widely different forms of disease? The skilful horticulturist has long since learned that a new and



improved variety in plant, flower, or fruit is most readily obtained by taking some specimen which shows a tendency to variation, and fixing by cultivation and selection the qualities desired. In fact, the slightest change in form or color may be made the starting-point for varieties and improvements so superior to the originals that a relationship is hardly suspected. Nor does he forget their diseases. Some he treats successfully, others, in certain locations and under certain conditions of climate, he cannot control, and abandons the plants as unfit for cultivation, and substitutes, perhaps, some related member of the family of better habits and better constitution. The careful and successful selection practised in the cultivation of the potato in recent years is an example of this. It is impossible to make a direct application of all these methods to the human race; and yet no medical man will cease to hope that, in some future time, society will interfere to prevent the propagation of individuals condemned from birth to disease, and possibly crime.

In no department of sociology are problems more difficult of solution to be found than those of state medicine: in the consideration of them the best faculties may fail. The past history is full of the errors of too hasty conclusions from imperfect and insufficient observations. As these conclusions are to have not only a theoretical value, but are to be the basis, in many cases, of governmental regulations, we must hesitate before accepting as final a proposition in hygiene, founded upon statistical data, brought together within narrow limits of time, place, or number.

During the last two years one question has been forced upon the attention of this body, and of the public health authorities of some of our seaports and manufacturing towns, which illustrates, in a marked degree, all the difficulties of a right solution of an apparently simple problem, in which sanitary interests and manufacturing industries appear to be opposed.

What is the danger to health from imported rags? We shall undoubtedly agree in this, that vague assertions of danger to health from this source, and denials of such danger, are out of place in this assembly; there are, surely, facts in the possession of some competent authority sufficient to settle the question. As the Association has directed one of its committees to investigate and report upon the subject at this meeting, a discussion on my part would be out of place.

The limits of this address forbid the attempt to enumerate all the achievements of recent investigations in the regions of preventive medicine in its widest acceptance; but there has been no single year in which a greater interest has been shown, or more encouraging results obtained, than in the period since our last annual meeting. We have the usual discouragements, to be sure, and many of them come from those who claim to represent our interests, for in sanitary affairs it is much the same as in politics; all persons are concerned in them, and all, therefore, claim the right to join in the discussion, with the usual consequence, that they who know but half the subject—and among these are oftentimes found professional titles that should be the guaranty for something better

—create more difficulties for the health authorities than those who know nothing.

It should never be forgotten that hygiene is not only a science, but that it has a very practical significance. Questions of sewerage, tenement-houses, noxious and offensive trades, contagious diseases, adulterations of foods and drugs, and many other important subjects, require prompt action long before science can have said her last word about them. The sick must be given the shelter of a hospital, even if we are not fully agreed what particular arrangement or construction is best; our cities must dispose of their waste matters by removal in some way, though it be still in dispute whether a single system of sewers or a double system should be preferred, or, again, whether the sewage itself should be purified by irrigation in any of its forms, or be subjected to the action of chemicals. The expenditure of public moneys under such circumstances is often criticized as an extravagance, but can our critics tell us which will come first, the pestilence, or the one perfect plan of sewerage?

In certain other emergencies, perhaps of not greater consequence than public health, no country hesitates. Have we not, within the last twenty-five years, seen a new engine for the destruction of human life brought into existence in every month of the year, in many instances only to pass into the limbo of forgotten things before an enemy has been found to practise upon?

There is enough to do in the directions where both science and experience have arrived at some definite conclusions; but advance in any quarter must necessarily be slow, made under the guidance of systematic experiments, and observations controlled by scientific methods, and not in the pursuit of the speculations of theorizers.

How to limit the confidence of communities to the true interpreters of science, and to discredit the loquacious schemer, is a part of the task, and no insignificant one, imposed upon this Association.

The vital statistics of certain countries and cities, and a careful examination of all that has been done in them for the comfort and protection of life, hold out a promise of a better state of public health than we have yet arrived at. The variations in death-rates in 37 registration cities, given in the United States census for 1880, a year in which no great epidemic occurred, range from 17.46 per thousand to 35.37 per thousand; the average for the whole number being 22.28 per thousand. There is evidence surely, in these figures, that something may be learned by the cities with the larger death-rates from their more fortunate sisters.

The state, the municipality, and the individual have the same great interests in preventive medicine. There seems to be a belief in the minds of many well informed persons, that, scientifically, public and individual medicine are distinct. It cannot be so. Whatsoever the private practitioner of medicine may do to assist the body in its struggle against disease, whatever resources of drugs or surgical appliances he may call in aid,—all these have effects which collectively make up the public health. The state may usefully aid and direct certain preventive



measures, but it cures disease in no other fashion than the individual does.

The principal object of scientific inquiry in preventive medicine during the past year has been, as in the preceding year, the study of the infectious diseases, and the micro-organisms associated with them.

Cholera, though not extending to new countries, as reason and past experience led us to fear it might at the beginning of the year, has received continued and careful investigation. While there is substantial accord in the belief that the disease is caused by a definite microscopic organism, and while most investigators confirm the discovery of Koch, there is still an opposition to his views, respectable in numbers, and more than that in reputation.

The question that concerns us most nearly, however, is that of the increase of our powers to control the disease.

The sanitary regulations of the last generation were framed principally with the purpose of preventing the introduction of the disease from abroad, by quarantine more or less severe. There appears now to be a general consent that municipal and individual cleanliness should occupy the first place.

A pure water-supply, an unpolluted soil, and a clean tenement,—these, with careful inspection at seaports and frontiers, with disinfection of infected objects, whether men or things, constitute the best defences of the community against all the infectious diseases not susceptible of relief by inoculation. By this is meant,—and the lesson has been most painfully illustrated in another city of this Dominion within a year,—that there is but one way to deal with small-pox, and that is by compulsory vaccination. The fact is not overlooked that an apparently intelligent opposition to vaccination does exist; fortunately not in large numbers in any fairly educated community on this side of the Atlantic, though it seems to be otherwise in England, if we may judge from published statements regarding popular feeling in the city of Leicester, and the recorded facts as to the neglect of vaccination there.

But if there be one man in this assembly who has had the training of a physician, who is familiar with small-pox and vaccination, and has met any of the responsibilities of a public officer of health, and yet can question the position here taken, may I ask if there is anything in the practice of medicine of which he is certain?

It is not denied that accidents have happened for which the authors should, in my opinion, be held to a strict responsibility; but the experience of the city of Providence, for so many years under the sanitary direction of our third president, Dr. Snow, will satisfy any reasonable inquirer that the accidents from vaccination are less than those of any disease entered in the most extensive nosology.

There is, however, one provision that should, in common justice, be made by the state for the protection of the people; and that is, if vaccination is by statute compulsory, then the public authority should offer the individual the security of a vaccine matter of known purity, either

by placing the cultivation of animal matter in the hands of a person or persons licensed for the purpose, or by giving to the state health authorities unlimited powers of supervision and control over the establishments concerned in this business. In Germany the government has assumed control of the production of animal matter for public uses, and has made some useful regulations for preserving a record of the history of the virus when taken from the human being.

The so-called cholera inoculations of Ferrán are mentioned here only for the purpose of condemning the low, commercial spirit in which they have been conducted; of noting the entire absence of scientific evidence of their value; and the serious rate of mortality reported as attending them.

Of all the epidemic diseases which appear to owe their origin to a specific cause, to a particulate contagion, not one in this country has more occupied men's minds, excited their fears, or destroyed all the habits of social life, than yellow fever has done.

Analogy with other contagious diseases, in which one attack serves as a protection against a second attack, has for a long time led men to look for means of relief like that given by vaccination in the person not already protected by an attack of small-pox. Within the last two years claims have been made by Drs. Freire, of Brazil, and Carmona, of Mexico, that they have made preventive inoculations with modified yellow fever virus, and have done it successfully. In April, 1886, Dr. Freire states that out of seven thousand persons inoculated by him, no one has been attacked by yellow fever, though the disease has been more than usually prevalent in Rio.

It is too early to accept or reject these claims; and they deserve and should receive, at the hands of competent experts on the spot, and with all the aid that large appropriations of money can afford, careful investigation.

It may be true that neither of the experimenters has isolated a body that stands in any causative relation whatever to the disease; and even then they know as much of the essential quality of the thing introduced into the human system as Jenner knew of the drop of lymph that could and should have banished forever from human life the fatal prevalence of small-pox.

It is no reproach to preventive medicine, and should not discourage us, that we cannot explain disease, and still less the protective influence of certain inoculations. We may watch nature, and discover what she does, and by what organs she does it, and that is all; and therefore, in Lord Bacon's sentence, "Nature is not conquered except by obeying her."

The great observer among the physicians of the English-speaking people said also, and we may agree, —

"I have ever held that any accession whatever to the art of healing, even if it went no further than the cutting of corns or the curing of toothaches, was of far higher value than all the knowledge of fine points,



and all the pomp of subtle speculations,—matters which are as useful to physicians in driving away diseases as music is to masons in laying bricks.”

In accord with the present views of science, the majority of all diseases are infectious, and are assumed to be produced by specific micro-organisms. The injury done by these to the living body does not apparently depend upon their mere intrusion into the tissues, with consequent derangements of nutrition, otherwise there should be no difference between the action of the innocent and of the pathogenic forms; but observation shows a vital difference. These variously named micro-organisms are living bodies, absorbing material, and giving it back in new forms to the media in which they live. The investigations of the past year have added much to our knowledge of these products.

The various fermentations have for some time been known to be results of the activity of these most minute of living objects; their share in the economy of life becomes more and more evident. It is probable that insoluble and unassimilable substances are converted into forms suitable for plant food by their activity. Very little seems to be known at present of the chemical products of the life of the pathogenic *bacteria* beyond their action upon gelatine, and the formation of certain offensive products. Since Nencki, in 1876, first gave a definite chemical standing to the ptomaines of Selim, some advance has been made in the study of the alkaloids of decomposition—enough to prove the important part played by them in many of the specific fever processes.

In another direction there is need of careful observation and experiment, and that is, on the side of the life history of these organisms in natural conditions; not under the artificial arrangements of sterilized gelatines in sterilized chambers,—a state of things only possible in the laboratory of the man of science,—but in the presence of the uncounted superfluities of life, ever present in the atmosphere we breathe, in the water we drink, and in the ground beneath our feet.

The phenomena of microscopic plant life are not likely to be found to be essentially different from those observed by the agriculturist, who knows, with a certainty obtained from unvarying experience, that his seed-beds must be protected with the utmost diligence from the invasion of the seed as well as from the growth of plants for which he knows no profitable use, and therefore calls weeds. And so of animal life. An ardent horticulturist once complained, in my presence, to a very learned entomologist, of the injury inflicted upon the solanaceous plants in his garden by the newly-arrived Colorado potato beetle, and was given for comfort the assurance that the pest would for the first year or two destroy, if not checked, all the plants of this family within reach; but that then the unfailing providence of nature would assert itself, and the beetle would be hunted down by enemies of every description, and become, in its turn, the victim of the antagonism which exists in the lower, but, so far as man's health is concerned, more important, forms of animal and plant life.

The virulence of many of the great epidemics that pass across the

world seems to undergo a like modification. In the city of Marseilles there died of cholera, in the epidemic of 1835, 22.53 per thousand of the inhabitants; in the last four epidemics the numbers per thousand have been between 3.56 and 6.79, and the decrease has been more marked still when larger aggregations of population are considered.

The history of the diseases of the domestic animals, which may be transmitted to man, has received a very important addition during the past year, in the facts recorded in a recently published report of the local government board, namely, the observations of an outbreak of scarlet fever occurring among the consumers of a milk-supply furnished by a farm in Hendon, England. Not to repeat facts, probably well known to you, let it be simply stated that a disease, recognized as scarlet fever in the human subject, had its origin in a disease of the cow, of no great severity so far as the animal is concerned, but communicable from one herd to another, and accompanied by changes in certain internal organs, as the kidney, which correspond very closely to the morbid changes in this organ in human scarlatina. From diseased tissues in the cow, Dr. Klein has obtained a micro-organism, presenting an appearance very similar to that of the streptococcus of foot and mouth disease;—cultivation, however, shows a striking difference between the two.

No disease of this class has of late occupied so much of the popular attention as rabies, and the preventive inoculations of Pasteur. These cannot be lightly dismissed; they demand an earnest and unprejudiced consideration. It seems to be settled that the inoculations have protected a certain number of dogs from rabies, though the evidence of the duration of this protection as yet fails, and it is clearly too early to express an opinion as to the amount of immunity conferred upon man. The frankness with which this life-long benefactor of his race has submitted all his processes to competent scientific inspection, adds another to his many claims upon our gratitude and respect.

Madelung has recently brought together in most admirable fashion the collective observations of the physicians of the Grand Duchy of Mecklenburg, in another very serious disease of man, acquired, apparently, from the dog chiefly, in some way at present not well understood.

The disease is produced by the presence of the hydatid cyst form, or acephalocyst, of the *tænia echinococcus* in the internal organs of man, with consequences generally fatal. These forms of disease, together with trichinosis—fortunately of little consequences in countries where the simple disinfection of thorough cooking is practised—and tuberculosis, the extent of danger from which is, however probable it may be, not yet demonstrated, indicate sufficiently subjects of too much importance to be neglected by the guardians of the public health.

What are the present needs of sanitary science, and how are they to be provided for?

For some of them state assistance is indispensable. Chief among these is a system of vital statistics where none exists, and an improvement of those already established. Incidental to this, something may be secured



for the regulation of the practice of medicine. In many of the states there seems to be no present possibility of obtaining a greater degree of regulation than can be afforded by a provision of law, that a valid death certificate can only be prepared by some person declared competent for the purpose by a responsible authority. To a limited extent this has been effected in Massachusetts, by the law which subjects the certificate of the cause of death to the examination of the board of health of the city or town wherein the death occurred. The revision thus secured is of some value in all cases, and of very great value where there is an efficient board of health.

The general government should, on its side, cause to be undertaken, by competent experts, scientific investigations of the diseases which are so general in their distribution that the whole country is affected by them, or of such character that the satisfactory inquiry into them would involve expenditures too great for the meagre appropriations of state and local boards of health. Researches so conducted would relieve these boards of a considerable expense now incurred in work of really national value. While it is possible that some richly-endowed institution of learning may at some time undertake the task, it can only be said, at the present time, that no one of them has thus far done so. Nor would it be desirable that the direction of such inquiries should pass out of the control of those most familiar with the health of the community. Some of the investigations carried on under the direction of the National Board of Health of the United States are cases in point of the highest scientific merit. They have an acknowledged authority everywhere.

A polluted water-supply, an improperly constructed sewage-irrigation field, a noxious and offensive trade, an adulterated food or drug, are the possibilities of every village of every state, and might be examined once for all, at an economy of time and money as marked as the excellence of the result could and should be made.

It is not a pleasant reflection for a citizen of the great republic that his own country is content to accept the results of investigations of disease made by the Local Government Board of England and the Gesundheitsamt of Germany,—inquiries that affect him fully as much as they do the Englishman or the German, while his own government has done nothing to properly study the one disease which belongs more especially to the western world, and has so often been the occasion of death, suffering, and disaster.

In other directions very much can be done—has been done—by voluntary association of existing state and municipal health boards, either in this society or in smaller conferences for more limited purposes.

With regard to the attitude of the public towards hygiene, it is certainly a misfortune that public health administration should fall into the hands of our profession exclusively. Within my own observation, the exercise of sanitary authority has been most successful, either in the hands of a single person, who would naturally be a medical man, but yet held, as one man always can be, to a distinct responsibility, or of a board composed of men of various occupations.

These mixed bodies represent that portion of the community interested in sanitary questions; on the one hand from education and occupation, on the other from intelligent public spirit, but without special training. Now, what more valuable touchstone for the amount of public faith in preventive medicine can be had than such organizations? Where can the interests of hygiene hope for favorable consideration if not here? If the executive officers cannot convince boards so constituted of the necessity of any given measure of regulation or prevention, what probability is there of finding in the general public the support that can only come from an intelligent confidence in state medicine?

The labors of a layman, Mr. Edwin Chadwick, may be said to have had as much, if not more, influence in securing to England her pre-eminence in sanitary affairs than those of any other single person.

The report of a sanitary commission of the state of Massachusetts in the year 1850, one of the most valuable contributions to public health literature ever made by that state, was the work of three men not of the medical profession. Among other things they recommended the establishment of a state board of health. The board, which a woman's persuasive influence helped into existence in 1869, has nearly attained the full stature of the organization that Lemuel Shattuck had devised nearly twenty years before.

The commission summed up the results of their inquiry in the following memorable words: "We believe that the conditions of perfect health, either public or personal, are seldom or never attained, though attainable; that the average length of human life may be very much extended, and its physical power greatly augmented; that in every year, within this commonwealth, thousands of lives are lost which might have been saved; that tens of thousands of cases of sickness occur which might have been prevented; that a vast amount of unnecessarily impaired health and physical debility exists among those not actually confined by sickness; that these preventable evils require an enormous expenditure and loss of money, and impose upon the people unnumbered and immeasurable calamities, pecuniary, social, physical, mental, and moral, which might be avoided; that means exist within our reach for their investigation or removal; and that measures for prevention will effect infinitely more than remedies for the cure of disease."

Though the great influence of the tenement-houses in our large cities upon the mortality rate, and the prevalence of many infectious diseases, has long been recognized, and though many devoted men and women have made it the business of their lives to effect some beneficial change in these habitations of the poor, still the record of improvement here is not an encouraging one. While the great city of the continent can show some of the best specimens of improved tenement-houses, their restricted number has had no perceptible influence upon her mortality record. According to a recent writer upon the subject, the number of deaths per thousand in the tenement-house population increased from 51.11 in 1870 to 55.50 in 1884, and this in spite of the largely increased and improved



hospital accommodations of the city, where, year by year, larger and larger numbers of the poor find such medical treatment as few can obtain in their own homes.

Our honored associate, Mr. Henry Lomb, with a philanthropic interest born of a thorough knowledge of the difficulties of this problem, has again this year added the stimulus of liberal prizes to a competition instituted for the purpose of obtaining from any source practical plans for houses of very moderate cost. May the result satisfy his generous heart.

The public burden from the victims of the misuse of alcohol is becoming with each day greater and more intolerable. Public measures of repression have thus far been of so little avail that it seems to me fitting, on an occasion like this, and with such an audience, to invoke for this most important subject the influence and teachings of the profession so largely represented here, and of all those whose business it is to help their fellow-men to healthy minds in healthy bodies.

It is the prerogative of this Association, if not the main object of its existence, to bring together the men who, by official position or by special attainments, have earned the confidence of the community to such an extent that an expression of opinion here will be regarded by the country as formulating the best knowledge in sanitary science, and the most trustworthy indication of the needs of legislative action.

The agency of the Association in procuring and improving the legislation which gave to the United States a National Board of Health, is known to all. That legislation came at a time of general alarm throughout a large and influential section of the Union, on account of the prevalence of yellow fever, with the attending congressional panic. Representatives of the people were not willing to return to their constituents until they had at least appeared to do something for the relief of the country, and accordingly selected that plan for a health organization that had the best recommendations.

The emergency passed by, and another congress, with that tender regard for constitutional limitations always noted in its dealings with the diseases that afflict the human being and sometimes well-nigh overwhelm the order of society, for the protection of which government exists, hastened to recede from action, in its best sense conservative; and some of the board's most creditable work in the investigation of diseases, of the greatest importance to the human race, became the subject of the senseless jests of a demagogue.

Energetic action on the part of the board was followed by complaints of unnecessary interference with rights, the exercise of which was claimed for the separate states; the jealousies and rivalries usual at centres of government asserted themselves. The members of the board,—men prominent in this association, eminent and honored in the profession to which they belonged,—were not of those who succeed in the manœuvres of the lobby, and so suffered defeat on a field where success would have brought little honor. This organization, which in its short life had accomplished so much in the struggle with infectious disease,

had placed on permanent record investigations of the greatest importance to sanitary science, and was entering upon more extended inquiries of even greater interest; then practically passed out of existence.

While the story has much of discouragement, there is surely something to be learned from it for further guidance. Why did it fail?

Three reasons for this may be given:—

*First*, that Congress does not properly represent the will of the people.

*Second*, that the people themselves really know and care very little about public health questions.

*Third*, that the powers and form of the board were not generally acceptable, or were not correctly understood.

The first of these propositions may be dismissed at once. Any one who has happened to be present at a conference between a congressional committee and a labor reform delegation will have little doubt that the average representative does not mean to fail in this direction. The truth is probably contained in the two last statements.

The meagre appropriations of money for public health service in the majority of the states, the very general absence of any trustworthy systems of vital statistics, the only sure basis for an accurate appreciation of results of sanitary measures, show not only the lack of that primary instruction in hygiene which must precede any law-making that is to be permanent, but give proof also of an indifference that will surely be reflected in the legislator and representative.

We might well abandon the work at this point, if it were not fortunately also true that there is an ever increasing class of thinking men and women, who are persuaded that it is of necessity a function of the general government to attempt to control those dangers to health that cannot be dealt with by the states alone; to investigate the causes of diseases which are of general interest, and affect no one state exclusively; or to establish an authoritative department for the diffusion of those vital statistics that can only be collected under the sanction and with the assistance of the general government; or to impart information upon condition of foreign ports, so important to the interests of commerce, in the days when quarantine is giving place to maritime sanitation. In the third place, the form is unusual; not that the same or a similar organization does not exist in many of the states of the Union, but in connection with the general government it presents neither the power nor the responsibility of a single head, nor the influence of a direct representation of all the states. The Department of Agriculture, the Bureau of Education, have had an important influence in their respective fields of inquiry; it is not probable that the influence would have been more widely or beneficially exercised by a board. A plan proposed by the Conference of the State Boards of Health, with the addition of the more important municipal health authorities of the country, and submitted to the Forty-Eighth Congress, was entirely in harmony with the political institutions of the Union. Each state board of health was represented

by a member, to be appointed by the president of the United States, to be paid a moderate compensation, and that only while actually employed. Annual meetings were to be held in Washington, for purposes of deliberation and for the election of the necessary officers, including an executive committee, who were to exercise all the power of the board in the intervals between the meetings. A board so constituted would represent practically all the power of the separate states, so far as matters of the public health are concerned, with the addition of whatever may belong to the national government, and would enter upon its work with a prestige unequalled in bodies of this sort. The possible number of the board, thirty-eight, may be considered a serious objection, but one of the favorite plans for a reorganization of the sanitary service of France contemplates a body of thirty-seven members, with meetings much more frequent than those of the proposed American board. This plan was presented to the appropriate committee in the last months of the last session of the Forty-eighth Congress; and, although it had the active and hearty assistance of the Secretary of State of the day, did not receive favorable consideration from the committee.

At the next annual meeting of the Conference of State Boards of Health there was manifest a general feeling that a national sanitary authority was a question of much greater moment than the particular form to be given to the organization; that if a board could not be had, then a bureau or a department; but the Conference wisely abstained from recommending specific action, and only asked of Congress some recognition of national sanitary interests. A bill for the establishment of a Bureau of Public Health in the Department of the Interior, with an organization similar to that of the Bureau of Education,—a bill in substance prepared by the Louisiana State Board of Health, and by it presented to the Conference,—was introduced in the present Congress, received a unanimous report from the influential Committee on Commerce of the House of Representatives, and now awaits action in the approaching short session of Congress. While the experience of any other country can be of little service to the United States, so far as the form to be given to the central sanitary authority may go, still, as frequent use has been made of the term Local Government Board of England, as implying an organization of several active members, it may here be remarked that the first comprehensive act, the foundation of England's national sanitary legislation, was passed in 1848. The General Board of Health created by this act was made up of members appointed by the Crown. The Local Government Act of 1858 extended the application of the principles of local government in sanitary matters, and divided the remaining functions of the general board of health between the Home Office and the Privy Council. In 1871 the public health powers of the Home Office and Privy Council were transferred to the newly established Local Government Board, composed of a president, who is sometimes a cabinet minister, sometimes not, and the following members *ex-officiis*,—Lord President of the Privy Council, the principal Sec-



retaries of State, the Lord Privy Seal, the Chancellor of the Exchequer. The president and salaried officers of the board do all the work. It is stated, upon good authority, that the whole board has never met. An organization of this sort is neither desirable nor possible on this side of the Atlantic; the only board, with the multifarious functions and powers corresponding to those of the Local Government Board, that has ever been established on this continent, was not a success, and has passed out of existence.

The question of a properly organized national health department, acting under clear and undisputed legal authority, with the necessary funds at its disposal, has recently been so well stated by the accomplished secretary of the State Board of Health of Illinois,—a former president of this Association,—that I quote his words with cordial assent:

“The present status of national sanitary legislation, and of the national sanitary executive, is admittedly defective and unsatisfactory. The history of the recent attempts to control the disinfection of rags; the complications at the port of New York concerning consular bills of health; the strictures upon the inspection service maintained along the coast, and in the matter of inspections on the Canadian frontier during the recent small-pox epidemic; the complaints of various boards of health that they are directed to look to the associated press for information and warning concerning threatened danger from abroad to their ports and territory, and many other similar matters, point to the necessity for a well considered and radical revision of existing national sanitary legislation.

“Consular bills of health, which are now as a rule almost worthless, might be made of the greatest value; and these, together with the prompt publication of direct and official information concerning the sanitary status of foreign ports,—such information to be secured by competent persons,—are essential to the prevention of the introduction of foreign contagion. Obviously such measures can be regulated, controlled, and provided only by the national government.”

As the Dominion has control only of quarantine and vital statistics, it appears that the state boards of health of the United States and the provincial boards of Canada are, at the present time, the only general sanitary organizations supported by public appropriations. They have steadily increased not only in the public esteem, but are year by year doing better and more effective service in the cause of state medicine.

Notwithstanding the fact that a similarity in the form of the various state boards has been accompanied by functions differing in the various states, it seems to be generally true, that, though they have been at first constituted with advisory powers only, for the most part, still the tendency has been irresistible to bestow upon them the supervision or the execution of the legislative acts effected by their recommendations. How extensive the jurisdiction of the state boards over the local health authorities should be made is a fair subject for much difference of opinion; but no one can dispute the great value of the advice and instruction

which it is possible for a competent state organization to give to the more limited body.

"Power," says Mr. J. S. Mill, "may be localized; but knowledge, to be most useful, must be centralized. There must be somewhere a focus at which all its scattered rays are collected, that the broken and colored lights, which exist elsewhere, may find there what is necessary to complete and purify them.

"The central authority ought to keep open a perpetual communication with the localities, informing itself by their experience, and them by its own, giving advice freely when asked, and volunteering it when it seems to be required."

There are many directions, however, in which the state can exercise a supervision and control, impossible or not practicable in the municipality: For instance, the execution of laws framed for the prevention of the adulteration of food and drugs; the protection of public water-supplies; the regulation and suppression, if need be, of noxious and offensive trades; the preservation of the purity of inland waters. This last subject, moreover, in more than one state, has already passed beyond the control of the injured community. There is at least one instance in my own state where a river, originally of exceptional purity, has become, for many miles of its course below a busy and growing centre of manufacturing industries, so foul, so offensive to both sight and smell, that the commonwealth has at last interfered for the protection of the inhabitants lower down the valley. But where shall the people of a neighboring state find their remedy when they are forced to receive the stinking waters of a public sewer in place of their once uncontaminated water-supply?

To the same class belong the measures to be taken for the harmless disposal of sewage. And here again we are forced to deal with problems of the greatest public importance, but which are still as far from a scientific solution as they have thus far proved to be from financial success. The publication, in 1877, of the experiments of Schlösing and Müntz, proving that nitrification in soil was due to the action of a living ferment, led a number of observers into the same field of research, and very considerable additions to our knowledge on this subject have been recently made, with a prospect of yet more facts of a distinctly practical value. Finally, the satisfactory enforcement of the laws relating to vaccination is not possible without the active interference of the state authorities.

From the date of the establishment of a board of health in this province, in 1882, the advance made throughout the Dominion in state medicine is, I understand, from those most competent to judge, of a satisfactory nature. We know the difficulties under which organizations for public health service labor here, as they do elsewhere. We appreciate the valuable work which you have done, and we intend to coöperate heartily with you; indeed, a selfish, or it may better be said a common, interest compels us to do so.

The recently published quarantine regulations of the Dominion are

quite sufficient for your protection, and for ours, if they are rigidly enforced. The vast sanitary importance of this highway to the west—the road by which cholera has, once at least, entered the country—cannot be overstated.

But it should at all times be remembered that a paper quarantine is, like a paper blockade, effectual only against the hostile force that never arrives: it creates a false sense of protection, and stands in the way of other, perhaps better, precautionary measures.

In carefully studying your local acts, there appears to be one thing permitted here which experience, in my own state at least, has condemned,—the presence of municipal councillors on local boards of health. The interests which are strong enough to elect a member of the council are too often not those having much regard for the public health; and again, the member of the council will find many easier roads to the favor of the people than those opened to him by sanitary legislation, and in nine cases out of ten he will follow the former.

There are also powers which, it seems to me, should be given to these boards: First, the right to use compulsory measures in case of any contagious disease, not in epidemics alone, as at present; and secondly, a statute authority to define nuisances in formal adjudications of the board. The Anglo-Saxon communities have followed too long, in sanitary matters, the dictates of the common law, whose functions begin and end with the punishment of the individual, knowing nothing of prevention or cure.

The units in our sanitary organization,—the local boards of health and private local sanitary associations,—are rapidly growing in number and efficiency. Their members are among our most active associates; their work lies in a limited and well defined territory, with all the conditions of which they become familiar, knowing the habits and needs of the people residing within their districts, the usual state of health, and the liability to endemic disease. They can supply, with detail and precision, the facts upon which the central authority must rely in forming its conclusions. In these boards are to be found members of the medical profession, who, day by day, in the unostentatious beneficence of their calling, pass from house to house, hearing complaints of sanitary defects, more often still observing those more serious nuisances which are not complained of. How much can be done by intelligent and fearless health authorities is to be read in every volume of our transactions.

It will not be deemed invidious, I hope, if you are asked to turn your attention to a great city, lying at the mouth of a river mightier even than the St. Lawrence, the gate through which many an invasion of pestilence has swept up the valley, carrying death and destruction in its train, and all the horrors that surely wait on the epidemic prevalence of sudden death.

Invariable attendants upon these visitations had been charges and counter-charges of neglect of sanitary precautions, of a commercial indifference to the public health, of a concealment of the true nature of the disease, of a purpose to use the misfortunes of a rival city as a means for



impairing its commercial importance. The result was general distrust, undoubtedly often unjust, but apparently inevitable.

A reorganized board of health, coming upon the stage at this season of discontent, in a declaration of its purposes, decided,—

To settle all questions at issue with health authorities of other states, and to establish with them relations of close alliance.

To so regulate quarantine as to furnish the highest relative guaranty of safety against the introduction of pestilence, with the least obstruction to commerce.

To favor, by strenuous efforts, the investigation of the pestilential diseases, with a view of ascertaining, if possible, their causes and methods of prevention. Success has attended the efforts to produce harmony among all local organizations having to do with the public health, and throughout the valley of this great river there appears to be confidence where formerly there was distrust.

As the result of the effort to reconcile the discordant elements in the quarantine problem, the obnoxious, unscientific, and brutal element of detention simply has given place to prompt action in the immediate cleansing of a vessel and of all that she carried, as the only rational hope of defence. To have accomplished all this is honor enough, even for that energetic leader in the work who thinks but little done so long as any part of the plan is incomplete.

Strenuous efforts have been made to secure from the national government the means to properly investigate the pestilence that concerns most nearly the whole southern seaboard of the United States and the lower valley of the Mississippi. This Association at the Washington meeting instructed a committee, designated for that purpose, to urge upon Congress the appointment of a commission of experts to investigate the truth of alleged discoveries of the specific cause of yellow fever, and of a method of preventing the disease by inoculation, and to obtain all information possible as to its cause and prevention.

A resolution of the same tenor was passed by the Conference of State Boards of Health. A bill providing for the appointment of the commission recommended was introduced in Congress; hearings were had before committees of both houses; a favorable report was made to the House of Representatives by the large and influential Committee on Commerce, with but two dissenting voices. Time failed, however, for the slow movements of large legislative bodies, and the measure awaits final action in the congressional session of the coming winter.

It is always difficult for men of our pursuits to understand the arguments by which senators and representatives satisfy themselves that property, as represented by certain inanimate objects or brutes, should be guarded by all the resources of the national treasury, by our armies and navies, by the ripest wisdom of the best experts, while that most valuable estate of all, healthy life, is put to the hazard of ruinous competition, selfish greed, and preventable disease. But it is more difficult still to see why a public measure designed for the relief of a whole community, and

offering a fair chance of success in the attempt, should have been opposed by some of those most directly interested. The value of the investigations of this commission is not dependent alone upon the final verdict passed upon the claims of the preventive inoculations of Drs. Freire and Carmona.

From all this I turn again in conclusion to salute the earnest, unselfish workers in these great interests of humanity, to say to each of you, with better reason, the words which the great orator of Rome addressed to the "foremost man of all this world:" *Homines enim ad deos nulla re propius accedunt, quam salutem hominibus dando. Nihil habet nec fortuna tua majus quam ut possis, nec natura tua melius quam ut velis, conservare quam plurimos.*"

## II.

### ADDRESS OF WELCOME.

BY CHARLES W. COVERNTON, M.D., CHAIRMAN PROVINCIAL BOARD OF  
HEALTH OF ONTARIO.

MR. PRESIDENT AND GENTLEMEN—MEMBERS OF THE AMERICAN PUBLIC HEALTH ASSOCIATION: It is from a double point of view,—of the honor you have accorded us in selecting our city for the fourteenth annual convention of this Association, as also of the benefit we shall derive from your deliberations,—that as chairman of the provincial board, on its behalf I extend you a hearty welcome. Rest assured that no effort will be spared in making it worthy of you and of the great country you come from,—a nation occupied not by a people of alien race, but speaking a common language, of a common lineage, and proud of a common literature, who more than on one occasion have demonstrated their belief that blood was thicker than water.

Animated by sentiments purely philanthropic, by firm convictions that many diseases could be prevented by due regard to the securing of pure air, pure water, pure food, due regard to proportionate labor and rest, more careful attention to sewerage and quick and effectual disposal of sewage, that Drs. Billings, Smith, Hunt, Cabell, and some other practitioners in New Jersey, about fourteen years ago, if I am correctly informed, conceived the idea of establishing this Association, thus emulating the great work before commenced by Dr. Bowditch, of Boston. Considering the great ability and merits of this very distinguished sanitarian, I feel that the mere mention of his name, although significant enough to the members of this Association as a collaborateur possessed of great literary attainments, and of advanced knowledge on every subject pertaining to preventive medicine, is yet scarcely sufficient for conveying an adequate idea to many of our visitors this evening of the great work in removing causes of disease that for many years as president of the State Board of Health in Massachusetts he succeeded in accomplishing. The recognition of the value of the annual Massachusetts reports—of which among other contributors he was *primus inter pares*—was not merely confined to this continent, but was equally European. Of him without flattery it may be said, *Nunquam tetigit quod non ornavit*.

From the small beginning of this Association in New Jersey, it has in the course of years so rapidly grown, that with the exception of two, every state in the Union furnishes its full quota of doctors, clergymen,



statesmen, architects, engineers, builders, plumbers, in fact a considerable portion of the body politic joining in the work undertaken by the members of this Association. During these fourteen years at the annual conventions papers have been read on which interesting discussions have followed,—on the meteorological conditions of different climates; on the reform of unhealthy surroundings of the inhabitants of cities and country places; on healthy and unhealthy sites for dwellings; on different soils, as tending to preserve health or otherwise; character of materials suited for, and arrangement of, dwellings; proper ventilation of school-houses; instructions for obtaining required amount of pure air per head per hour; proper sewerage, and disposal of sewage in such a manner that it may not return to offend our olfactories or vex us with the seven plagues of Egypt; our proportion of work and play; warnings against abuse of alcohol, tobacco, and other narcotics; hygiene of sick-chamber; precautions to be taken against the spread of infectious diseases,—and other allied subjects.

It is true, notwithstanding all the efforts of the American Public Health Association in the United States, of similar excellent ones in Great Britain and her colonies, as also in almost all the governments of the continent of Europe, that the progress of applied hygiene is not as rapid as sanitarians would desire; but truth has always required a long period of incubation before it is universally received and acted upon. In the armies and navies of different governments, where the teachings of hygiene can be strictly enforced, we have had abundant evidence, in the form of greatly diminished death-rate and of increased power of sustaining severe and long continued marchings, of the value resulting from their observance. The first and in some particulars the best book on hygiene was divinely inspired three thousand years ago on the banks of the Nile, and should have been read and taught by the monks and priests who alone in the Middle Ages were the physicians. That they failed to put in practice the use of the best disinfectants therein recommended was sufficiently demonstrated by the estimate of the loss of life from the various plagues that decimated Europe in the dark ages, being computed at 40,000,000. Applied hygiene, however, as set forth in the book of Leviticus, exercised a powerful influence in saving life in England during the fourteenth century, at the time that the Black Death had spread over the whole country, and caused such a frightful mortality that only one tenth of the inhabitants survived, as evidenced by the recorded fact that the only people whom the disease seemed to spare were the Jews, who, it may fairly be presumed, had regard to, and enjoyed immunity from, the fell disease by strict attention to the precepts of Moses.

If, Mr. President and Gentlemen of this Association, you may have occasionally felt that the results of your disinterested labors have not in every respect been all that you desired, you have at least the satisfaction of knowing that you have been the means of eliciting universally a demand for improved municipal sanitation, and that your legislatures are now more ready to authorize such measures as are best calculated for

securing a diminution of disease and prevention of the spread of epidemics.

Our Provincial Board of Health have also reason for attributing any measure of success we have met with since the formation of our board in March, 1882, to the ministry of Ontario being always willing to strengthen our hands by bringing forward as government measures health bills that in our judgment were requisite for success in the work of provincial sanitation. It is quite true that we did not succeed in obtaining all we asked; that a good deal of evisceration was practised by the members of the cabinet;—still the march has been onward, and we are thankful to be able to record that over our health bills, although brought in as government measures, there was no disposition manifested by the members on the opposition side to make them a subject of fierce debate, or to portray them as attempts at a serious invasion of the liberties of the people. Our progress in sanitary legislation may, without any great over-coloring, be summed up in the words spoken by the celebrated sanitarian, John Simon, some seventeen years ago, of the public health laws of England. He said,—“The principles now affirmed in our statute book are such as if carried into full effect would soon reduce to quite an insignificant amount our present very large proportion of preventible disease. It is the almost completely expressed intention of our law that all such states of property, and all such modes of personal action or inaction as may be of danger to the public health, should be brought within scope of summary procedure and prevention. Large powers have been given to municipal authorities, and under certain conditions obligations imposed upon them, to suppress all kinds of nuisances. Auxiliary powers have been given for more or less optional exercise as regards lodging-houses, burial-grounds, baths, factories, &c. In the interest of health the state has not only limited as above the freedom of persons and property in certain respects. It has interfered between vender and purchaser, has put restriction on sale and purchase of poisons, has made it a public offence to sell adulterated food, or drink, or medicine. It has provided that in every sort of epidemic emergency organized medical assistance may be required of local authorities, and in the same spirit it requires that vaccination at the public cost should be given gratuitously to every claimant.”

Comprehensive as these health acts—most of which are in substance to be found in our provincial statutes—would appear for ordinary exigencies, they would have proved comparatively powerless for protecting our province from such an extension of the severe epidemic of small-pox that first commenced in the spring of last year in Montreal, and which by the month of August had assumed such formidable proportions that unless prompt and effective measures had been taken instantly by the provincial government, there was reason for apprehending that our province would unhappily experience a loss of life and commercial depression equal to that which obtained in Philadelphia in the years 1871-'72. Dr. Bryce, in his paper entitled “Small-pox in Canada and the Methods of dealing

with it," to be found in the eleventh volume of the American Public Health Reports, has very ably and comprehensively explained the *modus operandi* pursued, also the favorable results following the careful attention given to all details. To the very prompt action of the Ontario government in this emergency the people inhabiting our province are indebted for their preservation from a loathsome disease, and the very serious consequences, direct and indirect, resulting.

The removal of the extreme quarantine measures in operation along the line of the Grand Trunk Railway between Detroit and the Suspension Bridge, most injurious to the company and annoying to the travelling public, may in a measure be attributed to the action taken by the Dominion government in delegating a member of the Ontario board to visit Albany and other places, and confer with the quarantine officers appointed by the United States marine hospital service.

That we have no longer any very great reason for complaint of the supineness of governments in passing the requisite statutes for the preservation of the health of the people, and in guarding against the introduction of infectious disease, is further sufficiently evidenced by the action of the government at Washington in sending Dr. Sternberg to attend the International Convention of Health, assembled at Rome, for deliberating on the best methods for preventing the spread of cholera, and Dr. Shakespeare to Italy, Spain, and India to investigate into the etiology of the same disease. The state of Illinois also manifested an equal anxiety for guarding against the introduction from Europe of cholera or small-pox, by commissioning Dr. Rauch to visit all the quarantine ports on the North American continent from the Gulf of Mexico to Grosse Isle in the province of Quebec, a most able and exhaustive report of which mission is to be found in the eleventh volume of the Transactions of this Association. Also by the concerted action of the different state boards of the Union and provinces of Ontario and Quebec, meeting by arrangement at Washington, December, 1884, for the purpose of reporting their various degrees of preparedness for meeting an epidemic of cholera should it unfortunately be brought to our shores. We have, then, only the long work remaining of educating the people generally to the necessity for the strict observance of all hygienic precepts, and in a willingness to coöperate with health authorities in their endeavor to advance the cause of sanitation.

From letters received from England last February, our board had reason to hope that at least fifty eminent English sanitarians and medical officers of health would attend this fourteenth annual meeting of the Association, and thus have imparted to it a *quasi* international character. Most favorable rates of passage, both for ocean and land transportation, were after lengthened correspondence procured; and on my visit to England this summer, at several meetings of medical men, members of different sanitary associations, I not only gave estimates of cost and time required for the solicited visit, but also gave a brief summary of the immense extent of territory represented at the yearly meetings by the



members of the thirty-four boards of health of the United States, as also by gentlemen representing all the professions and callings, interested in the diffusion of advanced sanitary knowledge. Following these explanations, there was a general expression of a great desire to visit this continent for the purpose of attending our Toronto meeting, and forming the acquaintance of many of their American cousins whose names were as familiar to them as those who have long occupied prominent positions at their own associations for a like purpose, and for some time I entertained the hope that at least a small contingent would determine on the visit; but the late season of the year, involving a return to their homes late in October or November, and I think also the desire of many to attend the Washington meeting of the American Medical Association next year at an earlier period, proved causes deterrent to the success of the endeavors our board had made for securing their presence; and, with the exception of one distinguished medical health officer, Dr. Russell, of Glasgow, the present convention will have no other representative from Great Britain. Whilst on this subject, I may mention that in addition to sending copies of the constitution, by-laws, and list of members of the American Public Health Association to a large number of sanitarians and medical health officers of Great Britain, as also the programme of the Toronto local, reception, and other committees, our board forwarded to the representatives of the different countries of Europe, that I had the pleasure of meeting at the fourth International Congress of Health, assembled at Geneva, September 4, 1882, the same documents, with an invitation to attend.

On behalf of our board, Mr. President and Gentlemen, I have only in conclusion to say, that during your visit to our city the members of this Association and the ladies accompanying them will command our very best efforts for making your brief sojourn agreeable for the time, and also a pleasant reminiscence, for many, of their first, and I trust not their last, visit to Toronto.

### III.

#### ADDRESS.

BY HON. ARTHUR STURGIS HARDY, PROVINCIAL SECRETARY OF ONTARIO.

MR. CHAIRMAN, LADIES AND GENTLEMEN: The Chairman has presented my excuse for appearing on this platform to-night. As he has stated, the Minister of Health is sick. A few minutes ago, when he asked me to take his place, I cheerfully assented, until he told me that it would be my duty also to take his place in extending, on behalf of the Provincial government, a welcome to the members of this Association. When I heard that, I was a little anxious to back out; but when he told me that my speech would be limited to a period of two or three minutes, I revoked my intention of retreating from what should not be a very difficult task. I do most heartily, on behalf of the government of this province, extend to the learned and scientific men, the men of business capacity, who compose this Association, the cordial welcome of this province. I extend to them a welcome, not alone because of their high reputation and their professional eminence, but also on account of the objects of their mission. Their object is to meet here to promote the good of the people, though perhaps to some extent at the expense of the profession to which so many of them belong—a profession so beneficent and benignant in its operations and associations, that I venture to believe that there will be no class in this community who will extend a more cordial welcome to the members of this Association than the medical profession of the city of Toronto. (Applause.) There should be no occasion, perhaps, in a country situated like ours, to say much by way of welcome to visitors from the other side of the line. We are a people of the same descent, coming from the same common stock, speaking the same language, inheriting the same literature, traditions, and laws; and therefore when one looks upon an audience of this kind, whether of ladies or of gentlemen, it is quite impossible to discriminate between those who are Americans and those who are Canadians. (Applause.) I was told a few minutes ago that a change had been made in the initials which adorn the badges worn by members of this Association; that last year the name had been changed from the United States Public Health Association to the American Public Health Association, and that that change had been made in order to take in Canadian delegates<sup>1</sup>, who then for the first time had taken part in your deliberations. (Applause.) That is to say, that the Association broadened the basis of its existence so as perhaps to take

<sup>1</sup> The speaker was misinformed. The Association has always borne its present name, but it did last year extend its territory so as to include the Dominion of Canada and the Provinces.—[SEC'Y.

in the greater part of America in admitting Canada. (Laughter and applause.)

I shall not at the moment do more than extend a cordial welcome to this Association on behalf of the government. Mayor Howland will extend to you the hospitalities of this beautiful city, though what they have provided for you I am not perhaps allowed or prepared to tell you. Some years ago you were rather celebrated for making tea—cold tea—in your own country. (Laughter.) There was one city, at all events, which did a good deal towards having a rather lively tea-party. I assure you that while perhaps we may not be equal to you in making a good cup of tea, yet we can present to you, in all their purity and excellence of quality, certain tasty dishes. For instance, in the article of fish (laughter), we can present to you such a dish as will tempt the appetites of every one; and I invite you very cordially to take it, and seize it without any fear of being seized in return. (Laughter.)

With reference to some of the remarks which have been so well made by Dr. Covernton, I might claim some little title, perhaps, to take a humble part in your proceedings. As secretary of this province, I had the honor to pass through the legislature the first bill relating to the public health—the one which constituted the present very able and efficient board of public health some four years ago. (Applause.) After that measure was sanctioned by the lieutenant-governor, I had also the honor of recommending to my colleagues and to his honor the appointment of the very able and distinguished board of health of which Dr. Covernton has for some time been chairman,—a board which has given so much satisfaction to the government and to the province that its constitution has remained substantially the same as it was when organized. It was our first board, and I think it is our best board;—certainly no one will contradict the statement that the gentlemen who compose it form a very able, efficient, and popular board. (Applause.) Unlike the prophets of old, they have some honor in their own country, and they have performed the onerous, delicate, and complicated duties with which the law charges them, so much to the satisfaction of the people at large, that it is universally felt, I believe, that they have been an honor to themselves, an honor to the government who appointed them, and a credit to the province which they have assisted so materially in connection with the public health. (Applause.) It only remains for me, Mr. Chairman, again to extend the cordial welcome of the government and of the province to the delegates from the United States. (Applause.)



## IV.

### ADDRESS.

BY WILLIAM HENRY HOWLAND, ESQ., MAYOR OF TORONTO.

MR. CHAIRMAN, LADIES AND GENTLEMEN: It is not a difficult thing for me to welcome the members of the American Public Health Association to this place. I have already been received by them; I have been welcomed by them; and I have already been allowed to make use of them in the most practical way. I do not say so in the ordinary complimentary sense, but I come before you to-night with a real feeling of having been assisted very much by the fact of the existence of this Association, and of its meeting in our midst. We have had a real public service performed for us in this city, from the fact of this Association's having made a declaration in favor of the great public movement in which, as I told you to-day, my whole heart is at present engaged. Do you not see, therefore, that under such circumstances I can welcome you with even unusual heartiness; that my welcome is not a merely formal or nominal welcome, because you have accomplished something real for us? and in my welcome to you as mayor of the city, I welcome those who have not been here for twenty-four hours, but who have been of incalculable benefit and assistance to the interests of this city. (Applause.)

It affords me great pleasure to hear from Dr. Covernton of the character of the gentlemen who compose this Association, and the great service that body has already been able to perform in the interest of the public health of this continent. Of all the great things which this nineteenth century is witnessing, the greatest, I believe, are the wonders that are being accomplished through this principle of association for a common purpose. It is really a marvellous thing, when you think of it. People of every condition, profession, industry, and occupation are associating; even the cranks of every kind are becoming associated in this way, and uniting their power. I know you will not consider that remark any reflection on this Association. (Laughter.) It gave me an absolute pleasure only a little while ago to welcome the members of the American Association of Undertakers in this city, whom I found to be a very interesting body of men. (Laughter.) When I was among them, I found myself most pleasantly situated, and I learned a great deal from them. I found that they were men who were really devoting earnest scientific attention to their own peculiar duties; that scientific lectures were being regularly delivered on the methods of preserving the bodies of the dead;—and they had a very thoughtful discussion on those methods of embalm-

ing which were in vogue among the old Pharoahs, showing that we had actually to go back to the intelligence and the brains of these ancient Egyptians for the methods of preserving the bodies of the dead in the present day. I assure you it was a very interesting discussion, and it was one from which the members of that body could learn much of service to them in the duties of their profession, as the unfortunate undertakers from the country, who did not know anything of these matters, could learn much from these scientific discussions of the methods which had been practised in the days of the Pharoahs.

There is no doubt that the power of association, and particularly associations for kindly and beneficent purposes, such as have brought you together, must be of immense value to the community at large. When after attending these meetings, where you tell each other all you know about those things which are harmful to the public health, and about how to remove these evils, each one of you goes back with authority to the people, you are no longer simply professional men, but you are men clothed with all the power and the intelligence which the Association confers upon you; you are able to speak with power and authority in the accomplishment of the results which you have in view; and of all these kindly associations, I think the one which deliberately comes together to devise the best means for doing that which is undoubtedly contrary to what might be considered as your own individual interest should be regarded with respect and admiration by every person who can appreciate a generous thing, or enjoy the sight of men doing good in the world. (Applause.)

Gentlemen, I have infinite pleasure in welcoming you to this city. I think the people of this city are in great welcoming trim this year. We are a happy, contented, and prosperous people. We think a good deal of ourselves. We have here a legislative, sanitary, and legal centre, and really, if it were not for Boston, we would say we had the centre of everything. (Applause and laughter.) At all events, we think we have here an important as well as a pleasant city. We are glad to have people come and see us; and though you may not go away with as good an opinion of our city as we have ourselves, still we hope you will be pleased with it. It does us good, when we are travelling, to meet with people and hear them say that they have been in Toronto, and especially to hear them say that while they were here they were well treated. When I meet such men I want to get hold of them and shake them by the hand, and perhaps shake hands with them three or four times. We have here a very adaptable people, especially our ladies. I do not doubt but that you will find ladies in this city who will adapt themselves as readily as any ladies in the world,—ladies who will go into raptures over the beautiful features of those bacteria which you discover with your microscopes, and who will say that those sweet diagrams of sewers are the loveliest things that you could possibly show them. (Laughter.) I have no doubt you will find them interesting and agreeable, and I think you will find them especially so if you have brought with you any beau-

tiful specimens, as I am sure you have, of the young American scientist. (Laughter.)

I am sorry that I shall not be with you to-morrow, but I am one of those individuals who have to acknowledge a superior power. I have left my wife over time down by the sea. (Laughter.) She cannot come to me for three times three good reasons,—three changes of cars, three days of travel, and three little children; so I must go to her, and I have to start to-morrow. (Laughter.) I will leave behind me, however, to act in my place, the chairman of the Executive Committee—a very pleasant gentleman, with whom I am continually quarrelling (laughter), but who, I am sure, will do everything in his power to make you feel at home in our city, and to enjoy your stay amongst us. (Applause.)



## V.

### ADDRESS.

BY JAMES B. RUSSELL, M.D., LL.D., MEDICAL OFFICER OF HEALTH, GLASGOW,  
SCOTLAND.

MR. PRESIDENT AND GENTLEMEN: When, last night, my friend, Dr. Walcott, expressed to me a desire that I should say something to this Association before the conclusion of its session, I respectfully declined the honor. I had seen enough of your meetings to convince me that this is no place for platitudes or rhetorical flourishes, and that I really had nothing to say which would warrant me in opening my mouth before you. However, on the way to my hotel, it occurred to me,—How shabby this is: here have I been welcomed by the members of the American Public Health Association to their meeting, and elected an honorary member, and yet I have not the grace to say “Thank you!” I confess that this view of the matter gave me much pain, and that I was not sorry when, this forenoon, the renewal of the suggestion made by my venerable friend, your First Vice-President, gave me room for repentance of the decision of the previous evening. Then, when your President announced with unexpected formality that I should address the Association at half-past nine this evening, he enlarged the scope of my very humble intention beyond my faculty of fulfilment. I feel that the interest which attaches to my presence among you is like that of the sole survivor of a shipwreck, or the oldest inhabitant of a town,—due to accident or good fortune rather than to personal merit. Of the thirty representatives of the old country who were expected to attend this meeting, “I only am escaped alone to tell thee!” Though a degree of distinction and notoriety has befallen me in this accidental way to which otherwise I could never have attained, it is an unhappy fate which has cast a Scotchman upon your coasts rather than a representative of England proper. Scotland, taken as a whole, is one of the most benighted countries on the face of the earth in the matter of sanitation. The Public Health Act (Scotland), which determines the control and local administration of sanitary functions, and contains the statutory law to be administered, was passed in 1866, and while England, and even Ireland, have frequently since that date had their acts extended, amended, and consolidated, we in Scotland have remained twenty years behind. Probably the chief explanation of this extraordinary state of affairs is this: One third of the entire population of Scotland is comprised in the eight chief towns, which range from 540,000 to 30,000 inhabitants. But as with you, the towns

are the centres of sanitary energy, for the simple reason that aggregation of population so intensifies the fatal incidence of deteriorated physical conditions that their improvement speedily becomes a matter of necessity. Neglect means extinction. Hence every one of these eight chief towns has local acts more or less advanced, but all far ahead of the organization and powers of the national act. The towns, having thus had their local wants in some measure satisfied, have ceased to regard with so much anxiety the lagging of national legislation; and having, in the intelligence of their rulers, sufficient motive power to secure energetic local administration, they do not experience the evil effects of the lack of supervision by the *central* authority, which is, through defective constitution and special executive as much as through want of statutory powers, practically useless for the control and stimulation of inert *local* authorities.

I need not say to this Association that this sectional method of dealing with the health interests of a country is eminently unsatisfactory. The very substitution of the adjective "American" for the words "United States," in the designation of your Association, proves that even over the length and breadth of this vast continent you have realized the solidarity of the interests as regards health and life of its millions of inhabitants, though characterized by diversity of government, of climate, race, temperament, calling, and aggregation. If you find conferences of states necessary to coördinate and harmonize action against the inroads of disease, your common enemy, to compel states which are blind to their own individual interests to see and acknowledge those interests, through the risks to which they expose their neighbors, how much greater must be the injury inflicted upon the dense cities and towns within the narrow limits of Scotland by the neglect of the rudiments of sanitation in the rural districts. Take the matter of milk-supply as an illustration. You will understand now, if not before, how in Scotland all our urban epidemics of enteric fever are imported with our milk from the country; how the death-rate from enteric fever and diphtheria is higher in our agricultural countries and rural parishes than in our densely populated cities; how scarlet fever attains to a fatality and a malignancy in our small towns and villages which are never paralleled in our cities; and how cholera, in its recent visitations, has ravaged hamlets while it has died out speedily in a few sporadic cases in the cities. It is only fair to the reputation of the Scotch for shrewdness and common-sense to state that the chief towns of Scotland are quite alive to the weakness of their defences against disease on their landward side. They have for many years persistently urged upon the imperial government the necessity of passing a new Public Health Act for Scotland. We believe that, while the sanitary necessities of towns will always be more exacting than those of the country at large, while, therefore, more stringent laws will be demanded and cheerfully submitted to in the towns, still the mean level, so to speak, of the physical conditions of health in the nation as a whole will be determined by the standard of the imperial legislation, as to local

organization, and general statutory law to be universally constituted and enforced. Therefore the reasonable course is to grant local acts to meet the more urgent needs of cities, but from time to time to advance the standard of national legislation, basing it on the experience of the cities, adapted to the advancement of the intelligence of the rural districts, which, though in sanitary matters behind, will tend to follow urban progress.

Dr. Mott's graphic and eloquent account of his investigation of the Biloxi fever reminded me of a frequent though but comparatively an insignificant experience of mine, when I have had occasion to penetrate some distant rural parish to inquire into the nature of disease existing in the family of a farmer whose milk seemed to be spreading, or likely to spread, enteric fever in Glasgow. However rough and inhospitable their reception may be, it is quite certain that the advent of the city officials in those benighted corners stirs up the bucolic mind, and forms the subject of very serious conversation in those rustic palavers which are held in the yard of the parish church on Sunday, while the bell is ringing its call to worship. Even the landlord may be deeply moved when his tenant comes to him and says,—“Those Glasgow people will not admit my milk until you build me a new milk-house and a washing-house. They say it isn't safe to boil dirty linen in the same boiler in which I scald the milk vessels.” The landlord will very likely sincerely bless the “cranks” of the medical offices; but when the farmer points out that if he can't sell his milk he can't pay his rent, he will not delay to comply with them. The causes and cure of obstructions to sanitation are the same in the little Scotch parish as in the state of Louisiana.

Now having, I hope, shown how hopeless it is to expect to get any sanitary wrinkles from a Scotchman, permit me in a few words to refer to two matters relative to public health, in reference to one of which I venture to think this continent might follow our example, and in reference to the other of which it has not advanced beyond our defects.

In Scotland, municipal government is not in the least tinged with politics. In this respect we differ both from England and Ireland. In the course of a municipal election with us no reference is ever made to imperial party questions or to the political opinions of the candidates. After a provost is elected—the civic head corresponding to your mayor—you have to ask whether he is a Liberal, a Tory, or a Radical. While in office he maintains neutrality in all local political movements. The town council will confer the freedom of the city on any eminent statesman who may visit the town, without regard to the side of the house on which he may sit. As for the tenure of office of municipal officials, it has nothing to do with the rise and fall of governments. I do not know how far the different practice which prevails here may be inseparable from the essential nature of your constitution, but however that may be, I am satisfied it is one which is in the highest degree inimical to the efficiency of the public health executive. It obviously must be so; and I know that it is felt to be so by those of your countrymen who take the



deepest and most intelligent interest in the amelioration of the health of the people.

The other matter to which I wish to devote one word is one in which you seem to act as unreasonably as we do. I come from the densest city in Great Britain, where we may be said to trample each other to death in the struggle for breath, like the prisoners in the historical Black Hole of Calcutta. It is probably, therefore, by instinct that I come across the Atlantic when in search of refreshment and restoration after a fall of hard work. A traveller's impressions are proverbially fallacious, and if I am mistaken you will forgive me; but it does appear to me that your space, and the ample provision of the beauties of nature which your people enjoy, exercise a deceptive and misleading influence upon their estimate of the meaning and importance of preventable diseases. The ill-health and loss of life caused by these diseases is, so to speak, diluted in the aggregate result of your space and your prodigal supply of fresh air. There is, therefore, a tendency to be satisfied with a standard of health and vitality which for the old country would be reasonable, or too high, but for you, under comparable climatic conditions, is too low. This is the tendency in rural districts with us, and I believe it to be so with you. They say our death-rate is only 15 or 18 per 1,000, as a justification of our reason for being satisfied with a large proportion of mortality from enteric fever and other preventable diseases. In this way it may be said that the very bounties of nature are made a shelter for the carelessness and culpabilities of man.

I have had many pleasant hours watching the growth of your towns, along your most recent transcontinental railway track, from the single log or framed and boarded home, through the aggregation of the same in streets, on to the city which is substituting substantial erections of brick or stone for the structure which has served its day. But I heard of enteric fever and diphtheria in those germinal hamlets and virgin towns, and I believe you do just as we do. You have no one to act, so to speak, as trustees for posterity, and to manage and lay out the state in the interests of those who are minors, or not yet born into the community. With us, home is added to home, and the population must grow to a certain point before it becomes an executive entity. Then disease has already entered, and physical conditions, which might have been avoided by doing in a right way what has been done in a wrong way, have manifested fatal effects, and can only be removed at great expense. I visited, the other day, the site of a town which had been swept off the face of the earth by fire a few months ago. Everywhere the work of reconstruction was progressing. Streets were laid out and houses were springing up. At the door of one I saw a sickly man enjoying the fresh air. I asked him what ailed him. He said he was recovering from typhoid fever, and that there were several other cases in the town. Some other experiences which have befallen me, and conversations I have had by the way with medical men and others, convince me that even in this new country, or in the newly settled parts of this country,

there is, exactly as in the rural districts of the old, a large amount of loss of health and loss of life from preventable disease, which is diluted in apparent gravity by the high standard of general health, so far as such diseases as bronchitis and other inflammations of the lungs, heart disease, and non-specific diseases in general are concerned. Yet it is unnecessary. It entails a serious loss upon a country which has room and work for all, and it is especially unreasonable that it should be allowed to continue on this side of the Atlantic.

Now, Mr. President and Gentlemen, permit me to thank you for listening to these incoherent remarks. Permit me to say that I have enjoyed my attendance upon your various sessions; that I recognize before me a band of earnest men, of high faculty and philanthropic aims; that I thank you for having adopted me into such a family; and that I shall always feel stimulated, whenever the clouds seem to darken about my humble path of official duty, by the remembrance of the undaunted courage of my fellow-workers in New Orleans and Memphis, under circumstances of difficulty of which happily I know nothing.

## VI.

### RECENT PROGRESS IN THE INVESTIGATION OF HOG CHOLERA.

By D. E. SALMON, D. V. M.

*Washington, D. C.*

The interest which this Association was pleased to show in the remarks that I had the honor to make on the cause of hog cholera, at the meeting of one year ago, encourages me to give a brief account of some more recent investigations of the same disease.

The experiments of the year, which have been very numerous, abundantly confirm the conclusion that this disease is caused by a bacterium—that is, an organism which exists in the form of a short rod, and is generally united in twos, and sometimes in fours. It is motile, stains deeply around its entire periphery, and, so far as we have been able to ascertain, does not form spores. It grows on nutrient gelatine without liquifying it. The cultures of it are fatal to mice, rabbits, guinea-pigs, pigeons, and swine, but they do not seriously affect fowls.

A very interesting point is, that pigeons may be protected from the fatal effects which ordinarily follow inoculation with these cultures, by first injecting into their tissues two doses of 1 cc. each of culture liquid, in which the microbe has been allowed to multiply, and has afterwards been destroyed by heat. In other words, the products of the bacterial growth confer an immunity from the effects of the living germs. We have used forty-four pigeons in these experiments, and while a few of the experiments have given negative results, the majority of them have been perfectly satisfactory. A brief reference to a few of these experiments will give a clearer idea of their convincing character. The heated virus was in all cases tested for living germs before using as a preventive, by placing two or three drops of it in a tube of fresh culture liquid, and allowing it to stand in the incubator a sufficient time to show if any multiplication was possible.

In the first experiment, four pigeons received the two doses of sterilized culture necessary to protect them, one received but one dose, and one pigeon kept for a check did not have any protective treatment. The six were inoculated with the same dose of a culture containing living germs. The effect of this inoculation was to kill the unprotected pigeon in twenty-four hours. The bird which had received one dose of protective liquid lived forty-eight hours. The remaining four, which had been treated with two doses, were not at all affected.



In the second experiment there were six protected birds and three checks. All of these being inoculated with strong virus, the six protected ones remained well, two of the checks died, and one was not affected. In two other experiments there were six protected birds and two not protected. When inoculated with the living germs, the two unprotected ones died, and all the protected ones remained well.

We have not yet been able to apply this method of granting immunity to other animals, owing to the many difficulties encountered in the investigations, but the principle is a very interesting one, and will doubtless be developed in the future.

While this disease as it occurs in the herds of the country is extremely virulent and fatal, a considerable dose of the virus may be injected hypodermically without producing serious effects in swine. We have inoculated in this way with  $\frac{1}{4}$  cc., and have lost no animals from this dose. By increasing the quantity to  $\frac{1}{2}$  cc., the operation becomes more dangerous, but even in this case only one animal out of eight succumbed. Such inoculations evidently confer a certain degree of immunity, because the individuals which have been operated upon in this way may afterwards be inoculated with 2,  $2\frac{1}{2}$ , or even 3 cc. without any serious results.

The test of inoculation, however, is certainly far from being as severe a test of immunity as actual exposure to the contagion in infected pens. Thus, pigs which had received  $\frac{1}{4}$  to  $\frac{1}{2}$  cc. of virus for a first dose were not sufficiently protected to enable them to resist exposure to sick pigs in infected places.

If so large a dose of virus may be injected into the tissues without producing fatal effects, it seems difficult, at first, to explain how the contagion, carried on the feet of animals and people, and in many other ways in which but a small quantity can be transported, is able to infect individuals and start new outbreaks. Yet this is evidently true, or the plague could not spread from herd to herd as frequently as we know it does. It would seem that the small quantity of contagion which is carried and deposited upon the new premises must find there a nidus suitable for its multiplication before herds can be infected in that way.

To test this hypothesis, we have placed the organism in hay infusion, and find that it is able to multiply in such a liquid; but what is more remarkable is its life and rapid development in ordinary water. An idea of this can be obtained from the following experiment:—10 cc. of Potomac water, such as is supplied to the families of Washington, was sterilized by heat, and as many germs of this disease added as would be carried on a small loop of platinum wire dipped into a culture liquid. It was then tested to determine the number of microbes that had been added to each cc., and there were found to be 26,240. This was September 8. On September 9 there were 201,600 germs to the cc., showing that they had increased nearly eightfold in twenty-four hours. September 10 there were 1,296,000 germs to the cc., an increase of fifty-fold in forty-eight hours. September 13 there were 2,608,200, an increase of one hundred-

fold in five days. The limit of growth to each cc. of water is reached by the last figures given, and after this period the number of living germs begins to decrease. We have here, consequently, the demonstration that this pathogenic organism may multiply to a wonderful extent in water as pure as that of the ordinary running streams of the country. It is true that in this case the disease germ did not contend with the ordinary germs with which all waters in nature are more or less contaminated, and it is possible that their development would be somewhat affected by the presence of these other species. It may be admitted, however, that these germs have the power of living and multiplying in water or in moist organic matters, such as usually exist in enclosures where hogs are kept.

Drying is destructive to this germ, though it retains its vitality for a considerable time. With drops of culture liquid dried on cover glasses, we found that in some cases the germs would all be destroyed after eight or nine days, but in other cases there were still living germs after twenty-two days. In small pieces of spleen not larger than a pin head, which were thoroughly dried, there were still living germs at the end of forty-nine days.

The tests of disinfectants have given some unexpected results, and emphasize the necessity of determining the effects of these agents upon each specific microbe. This organism is destroyed by a solution of permanganate of potash of 1 : 5,000 acting for fifteen minutes; of sulphuric acid, 1 : 2,000 is required; of carbolic acid, 1 : 80; of mercuric chloride, 1 : 75,000; and in some preliminary experiments with mercuric iodide, this agent was found efficient in the strength of 1 : 1,000,000.

As stated in my paper of last year, the germ which we have found in hog cholera is very different from the bacillus of *rouget* and *rothlauf*. Within the year Schütz has described the microbe of the disease called by the Germans *schweineseuche*, or swine plague. This organism is also different from ours, though it belongs to the same genus, each being a short rod or bacterium. The comparison of these different species is very interesting. The bacillus of *rouget* and *rothlauf* is, in its microscopical characters, very closely related or identical with the bacillus of the septicæmia of mice; while the bacterium of *schweineseuche* approaches very closely or is identical in such characters with the bacterium of rabbit septicæmia. The bacterium of fowl cholera has also been considered to be identical in microscopical appearances with the microbe of rabbit septicæmia.

The bacterium of hog cholera differs from that of rabbit septicæmia in having great motility in liquid cultures, while the latter is without any power of movement. It also stains differently. Properly prepared specimens show a light centre and a uniform band of darker color around the entire periphery. The bacterium of the septicæmia of rabbits, when stained, has a light median portion with deep stains at the ends. These peculiarities brought out by staining enable us to distinguish very easily under the microscope between the two germs.

## VII.

### TORONTO SEWERS.

BY ALAN MACDOUGALL, M. INST. C. E., F. R. S. E.

*Toronto, Canada.*

The city of Toronto is well situated for sanitary purposes, and presents no features of difficulty for the effective and economical construction of its sewers. The city lies on a gently sloping bank, which rises from the lake to Bloor street, a distance of one and three fourths miles. The strand or lake shore was, about thirty years ago, very much on the line of the street now called Front street. It was not until the Grand Trunk Railway was constructed in 1855 that the water front was moved to its present line. The main north and south thoroughfare has always been the Indian line or road known as Yonge street, which extends as far north as Lake Simcoe, a distance of forty-five miles.

The portion of the city more particularly alluded to in this paper is divided by its natural conformation into a drainage area bounded on the north by Bloor street, the east by the river Don, the west by the Garrison creek, the south by the lake, and having the lake for its outfall. Immediately to the north of Bloor street are two ravines known as the Rosedale ravines, which are the natural outlets of the drainage for a large area to the north of the city.

Yonge street divides the city into east and west divisions ;—on the east side, Church, Jarvis, Sherbourne, Parliament, and Sumach run from the lake to Bloor street ; on the west, Spadina avenue and Bathurst street connect the bay to Bloor street. On all these streets are sewers running to the bay, forming trunk sewers for their respective systems. To these must be added Simcoe street, which carries the sewage from the north of Bloor street through the Queen's park to the bay. These sewers are all shown in blue on the large map.

The main east and west thoroughfares are King and Queen streets, situated respectively one fourth and one half mile north of the lake. The street known as College street and avenue, along with Carleton street, a mile north of the lake, has only lately been opened up as a thoroughfare, and along with Dufferin street, the western limit of the body color on the small map, cannot be considered in the limits of this paper.

Old maps and plans of the city show a number of streams intersecting the city in a generally south-east direction to the lake. These divided the land into series of ridges, which were heavily wooded, chiefly with cedar. In the valleys, as a matter of consequence, the land was wet and swampy. The subsoil in the lower or southern portion is stiff clay ;



northwards it is sand. The line takes a north-west direction from near the intersection of Gerrard street and the Don. Willows and trees of that class were very common here twenty years ago, which is evidence of a damp subsoil. The change in the climate and dryness of the city in the past twenty years has been great, and markedly for the better.

The city of Toronto celebrated its semi-centennial two years ago. Its present area extends over eighteen square miles; the population is 130,000. The area is marked out in a blue border on the map. The main part of the population is centred in that portion which, till a few years ago, was comprised within the city limits bounded by Dufferin street on the west, Bloor street on the north, the Don on the east, the lake on the south, and is colored solid on the map. It embraced an area of seven square miles.

The land slopes to the lake from Bloor street, and the rise is steepest as far as Wellesley. The level of Bloor street is 175 feet above the lake, on Yonge street. It is nearly level for its whole length. The fall on east and west streets is towards the river Don; there is ample grade in the higher part of the city for any proposed intercepting sewer, and on Queen and King streets there is sufficient fall.

From the Garrison creek sewer there will be sufficient fall for an intercepting sewer along the line of Front street to the river Don.

The following history of the sewers is abridged from Mr. Sproatt's admirable report on the proposed trunk sewer, presented to the city council in March of this year :

The first brick sewers were constructed in 1843, Mr. John G. Howard being at that time city engineer. There is no record of his having proposed or adopted any definite "system." His sewers all discharged into the bay.

Mr. Thomas H. Harrison, city engineer in 1856, reported on a system of drainage for the city and its vicinity, recommending a division of the city into eight drainage areas. The eastmost he proposed to drain into the river Don, and the westmost, or No. 8, into the Garrison creek; the rest were to enter the bay. The mains he recommended have been built, and are those already referred to on Parliament, Jarvis, Yonge, and Simcoe (constructed in 1854) streets, Spadina avenue and Bathurst street.

Mr. Kivas Tully, C. E. (one of the experts appointed this year for the report on the trunk sewer system), approved of the scheme, and says that "by this plan and report the whole sewage of the city may at any subsequent period be carried easterly across the river Don, should it be desirable to do so." He objects to the apparent necessity of using the bay as the outfall, predicting the pollution which has really taken place.

No action was taken on this report for an outfall sewer. It was not till the appointment of the late Mr. Frank Shanly as city engineer in 1875 that a complete survey of the city was made, bench marks established, and plans for an offtake sewer prepared. Mr. Shanly proposed to

build the sewer on Front street, beginning at the Garrison creek and emptying into the marsh known as Ashbridges bay, to the east of the Don. His estimate, including diversion of the river Don, was \$200,000. The sewer was three miles long, with a fall of five feet per mile. No action was taken on this report.

The late Mr. Redmond Brough, Mr. Shanly's successor, 1882, brought in a report for main sewers to carry the sewage. He commences with a sewer for the Garrison creek of sufficient capacity to carry off the drainage of the north-western portion of the city (which has lately been constructed), with branches running east and west on Bloor street; an intercepting sewer along the front of the city discharging into the Don, with settling chambers, an overflow and discharging weir by which storm-water, and, when required, the whole flow of the sewer, could be turned into the river Don. From the chambers on the west side of the Don, a suitable conduit would be carried eastward through Ashbridge bay, and be discharged into deep water in the lake opposite Scarboro' Heights, six miles east of the Don. He estimated the cost of the Garrison creek sewer and its branches on Bloor street at \$402,000; intercepting sewer along front of city from Garrison creek to Don, \$292,000; chambers at the Don, with pipe under the river, \$35,000; conduit from the Don eastwards and out into the lake, \$800,000. No action was taken on this report, and Mr. Brough's lamented death, occurring shortly after the report was sent in, delayed proceedings.

The present engineer, Mr. Charles Sproatt, was appointed in 1883, and in 1884 \$100,000 was granted for the construction of the Garrison creek sewer, which was completed last year. This sewer drains 14,050 acres, of which 7,050 lie to the north of the city in the township of York, and 7,000 within the city limits. Mr. Sproatt has kept the construction of a trunk sewer with an outfall beyond the city limits steadily in view ever since his appointment. His report and plan for intercepting sewers, which led to the employment of the Hon. W. J. MacAlpine and Mr. Kivas Tully to consider a scheme for this purpose, will be mentioned later on.

All water levels are referred to a certain rock, now under water, at the western entrance to the harbor, at a point known as the Queen's wharf. Zero of water level is nine feet above this rock. The lake level fluctuates considerably during the year from a variety of causes, such as increased flow of water into the lake from the rivers and the action of the winds.

Reference to the map shows the position of the spit of land running out from the eastern portion of the city close to the mouth of the river Don, which formed a peninsula till 1853, when the sea made a breach and formed what is now known as the Island. The formation of this sandy deposit has received much attention from many writers, especially from Mr. Sandford Fleming, C.E., C.M.G., whose interesting treatise, along with Prof. Hindes's, is published in the Proceedings of the Canadian Institute. The attention of persons interested in geological questions is directed to these papers, as also to the official reports of the Department

of Public Works, Ottawa, in 1881. The break in the peninsula is now known as the "east gap."

In the limits of this paper it can only be remarked that there is a decided westward set of the waters of the lake at certain seasons of the year, in the spring and in the fall, which has a very strong influence on the south shore of the island and the entrance at the west end of the harbor. The scouring along the south shore of the island is increasing yearly. The deposit of sand on the west entrance of the harbor has become so marked every year of late as to occupy the serious attention of the harbor commissioners and the city council, as the existence of the island and the western entrance to the harbor seem to be threatened. The federal government has built a breakwater along the south side of the island for 6,500 feet from the east gap, and it is to be hoped that protection works will be extended as far as may be necessary for the safety of this important adjunct of the harbor.

The opening at the eastern gap undoubtedly plays an important part in regulating the change of water in the bay. Float observations were carried on in May and June by the author, under instructions received from the city engineer, to ascertain what currents existed in the harbor and the lake, for the information of the experts appointed to report on the trunk sewer scheme. The inquiry was too exhaustive to be settled in the limited time. No definite current was found in the harbor: the water is influenced by the prevailing wind, and no set from west to east was found. In the lake, floats in twenty feet of water and under were influenced by the prevailing wind; in thirty feet of water six miles east of the harbor, at Scarboro' Heights, the current set eastward during the observations. Deep water floats placed off the south shore of the island gave negative results.

The pollution of the water front from sewage has become so great that the consideration of intercepting sewers and a main outfall sewer could be delayed no longer. Mr. Sproatt, in his report to the city council in March last, proposed two schemes. The first included two intercepting sewers, one midway between the bay and Bloor street on the line of Gerrard street, the other on Front street. The sewerage of the Rosedale ravines was to be led into the Gerrard street sewer, which was to have been on a high level. The Front street sewer, of necessity on a low level, was to be connected to Gerrard street by a pumping station, placed on the flats of the river Don.

A main outfall sewer from the line of Gerrard street would carry the sewage into deep water of the lake at Scarboro' Heights. This proposal necessitated the use of a pumping station, and was estimated to cost \$1,418,355.

The alternative plan embraced a main intercepting sewer along Queen street to the Don, passing under the river by a syphon, with a second intercepting sewer along Front street, which was also to pass under the river by means of a syphon, and connect with the outfall sewer on the continuation of Queen street, and follow the line of the outfall sewer



mentioned in the first proposal. This proposal also necessitated a pumping station for the Front street sewer, though of a cheaper description. The outfall was intended to be at Scarboro' Heights. The estimated cost of this plan was \$1,433,483.

The experts associated with Mr. Sproatt in the final report,—the Hon. W. J. MacAlpine, C. E., of New York city, and Mr. Kivas Tully, C. E., of Toronto,—have recommended two main intercepting sewers from the western portion of the city eastward to the Don; one on Gerrard street and its line produced westward to near the Garrison creek, the other connecting with Garrison creek near Front street, passing along Front street to the river Don. These sewers will be connected by a sewer laid along the flats of the river southward from Gerrard street to Front street. In addition to these an intercepting sewer will be laid in the valley of the Rosedale ravines from Yonge street, and pass in a south-easterly direction to join the Gerrard street sewer.

The main outfall will extend in a south-easterly direction from the intersection of Front street and the river Don, discharging into the lake thirty feet below the surface. Mr. Sproatt, in a minority report, recommended the outlet being placed a mile further east than the others, at an increased cost of \$280,684, which has been adopted. A by-law has been submitted to authorize the construction of these works at an estimated cost of \$1,395,784. It will be voted upon during the present session of the Association.

Situated as our city is, in common with many others, on the shores of the great lakes, where we are not within the influences of direct currents, the influence of sewage on the health of the inhabitants through pollution of circumambient water, and its relation to the water-supply, are questions which cannot fail to elicit the greatest interest. The cities of Chicago and Cleveland have lately been compelled to consider these questions, and in view of the proposed trunk sewer for this city, no discussion can be more profitable.

The water-supply is drawn from the lake on the south side of the island, at a point about 786 yards from the shore, or two and one half miles in all from the pumping station on *terra firma*. The intake crib is situated in thirty feet of water. The water is carried through a six-foot diameter wooden conduit for 2,357 feet to the "shore crib," thence through a four-foot wooden conduit 6,007 feet across the island and Blockhouse bay to the "connecting crib," thence across the bay in a three-foot cast iron conduit 4,603 feet to the well of the pump-house. Two Worthington engines of 520 horse-power have been in use from the commencement till last year, when two geared engines of the Martin type were added. The four engines have a combined capacity of 28,800,000 U. S. gallons per twenty-four hours. The daily average quantity pumped is between 14,000,000 and 15,000,000 gallons. There are over 22,000 water services put in.

Whilst it is only too well known that the waters of the bay are grossly polluted at the wharves, it is satisfactory to be assured by those compe-

tent to declare it, that the water at the intake crib is perfectly pure, and free from taint and pollution. It is nominally pumped up to the reservoir in the north of the city, 216 feet above lake level, and three and one third miles from the pumping station, but the greater part of the water service is drawn directly from the pumping engines. The capacity of the reservoir is 40,000,000 U. S. gallons. There are no arrangements for filtering either at the pumping station or at the reservoir. Consequently during storms on the lake the water is frequently very muddy, and unfit for use without domestic filtration or settling.

No systematic gaugings have been made in any of the main sewers to establish the daily flow of sewage; the quantity entering the harbor is only assumed from the amount of water consumed. Still it must be apparent to everybody who gives the subject a moment's consideration, that a large quantity of sewage is daily discharged into the harbor; that this foul matter must pollute something, and that something is the water front. The evidence of the senses bears witness to this, as numerous travellers by our ferry boats can attest; the constantly bubbling of the water at the docks conveys intelligence of pollution to the more practised and instructed observer.

The report of the experts on the proposed trunk sewer placed the outlet at a point in thirty feet of water, and two and three fourths miles to the east of the intake crib of the water-works. City Engineer Sproatt, in a minority report, has urged the location being placed a mile further east, making the distance three and three fourths miles from the intake crib. This is certainly judicious, as it has not been established that the westward current does not affect the intake crib.

The city is rapidly assuming the proportions of a large manufacturing centre: the principal factories are situated near the bay. There are chemical and other works of the same nature, the sewage of which is always of a deleterious and foul character. The hog-pens of the Grand Trunk Railway Co., and the cow byres of the Gooderham & Worts Co. (limited), where 4,000 cattle are fed every winter, discharge large quantities of sewage into the bay and lake. Considering the size and population along with that of other cities, the sewage of the city is not yet of the offensive nature so frequently found in manufacturing centres; still this is no evidence that the spores and germs of zymotic disease can be so infinitely diluted as to become harmless.

So long as the current of the lake is neutral, or *not westward*, there is no danger to be apprehended: the sewage will mix with the water, and become so diluted as to be innocuous. It is stated by Mr. MacAlpine in his report that the temperature of the lake water from thermometric readings taken last summer is below 50° Fahr., a temperature generally too low for decomposition to set in, and low enough to arrest the propagation of certain micro-organisms. But this does not affect the germs of zymotic diseases, which, though dormant in water, would rapidly revive and propagate if introduced into the system by drinking-water. Extensive research has been made into this question, and it is not yet fully

solved. In view of the late discussion in the Institution of Civil Engineers, London, on Dr. Frankland's paper on "Water Purification; its biological and chemical aspects,"<sup>1</sup> the author does not attempt to enter into any discussion in the limits of this paper.

On these grounds the greatest care is requisite to have the outfall as far as possible from the intake of the water-supply, and the action of the city engineer is to be highly commended in placing it a mile further east than was recommended by the experts. There is such a malicious and wanton waste of water in the city that the sewers benefit largely therefrom, and are flushed by the waste as well as by the waste water used in the hydraulic elevators in the various public buildings.

There is no town near enough to be affected by the pollution of the lake: the question of water pollution is confined altogether to the city. On this point the experience of other cities, such as Chicago, Milwaukee, Cleveland, and others, is of value, and the lessons learned by them should not be thrown away by Toronto.

As a biological question, the vitality of certain spores and micro-organisms seems to be infinite, and the power of reproduction beyond conception. The latest researches into potable and sewage polluted waters have determined the existence and reproductive powers of numerous micro-organisms, and also that no potable water is absolutely free from microcosms. The decisions of leading biologists are that there are numbers of these micro-organisms which are harmless.

Sewer ventilation is a vexed question;—whilst all its advocates are agreed on its utility, they differ on the means to be adopted. Gratings over manholes in the centre of the street have received much hostile criticism;—in the depth of winter it is a common sight to see steam ascending from them in this city. From observations made by the author, this is more frequent on "washing day" and in the afternoon. The steam is, no doubt, the heated air of the sewer being condensed by the intense cold above. It is also due in some streets to escaping steam, as the practice of blowing off steam engines into the sewers is too much indulged in.

In the depth of last winter the author had occasion to make some observations in Garrison creek sewer with Mr. C. Rust, C. E., assistant city engineer. The external temperature was below zero: the sewer was filled with a dense mist or fog. The temperature of the sewer was about 40° Fahr. The notes were unfortunately lost in a fire in the author's office.

The amount of injury likely to be inflicted on persons using the streets and passing over the gratings is, in the author's opinion, less than that to be incurred from air from untrapped or ill-formed street gullies. Pedestrians congregate at street corners, and stop to hold conversations in close proximity to and often over gullies, who never do so over street gratings when placed in the centre of the street.

<sup>1</sup> Proceedings Inst. C. E., vol. lxxxv.



When a sewer has a series of manholes at regular distances apart, there must be a current of air through it. How far the system is effective, or what the velocity of the air is, is largely matter of conjecture. Parkes quotes observations by Dr. Burdon Sanderson which show that the current is as much into as out of a manhole. The most interesting and valuable observations on this point are those of Mr. G. R. Strachan, C.E., made on a sewer in Chelsea, England, and reported in the Proceedings of the Institution of Civil Engineers.<sup>1</sup> Mr. Strachan had two chimneys erected some distance apart, and ascertained that the air in the sewer was changed once in every thirty-one and one half minutes. He also notes that bacterial growths on the walls of the sewer had decreased in the ventilated portions.

The only sewer in the city on which observations can be conveniently carried out, having all the conditions necessary, *i. e.*, manholes and a ventilated end, is the newly constructed Garrison creek sewer. Through the courtesy of the city engineer, the author was enabled to carry out a few observations in this, which is open at both ends and ventilated throughout with manholes. The results now offered are from observations extended over a short period during the writing of this paper. The sewer is 7 feet 6 inches in diameter as far as Queen street; 6 feet 6 inches in diameter up to the junction of the Dover court sewer; and 5 feet 6 inches for the rest of the way.

On the 20th of September, the wind at the lake was southerly; a little north of Queen street, where the observations were made, the wind was N. W. 3 miles an hour; the velocity in the sewer was  $1\frac{1}{3}$  miles an hour, northwards.

On the 21st, the wind was S. to S. E. about 3 miles per hour; temperature in sewer,  $57^{\circ}$ , air,  $56^{\circ}$ , sewage,  $55^{\circ}$ , Fahr.; the current of air was northwards, up the sewer, at an average rate of 1.4 miles per hour. At the junction of the Dover court sewer and in that sewer, which is 4 feet 6 inches in diameter, the velocity was almost 3 miles per hour. In the extension of the main sewer, about 100 feet up from the junction, the air was calm. Readings taken in a manhole with the grating on gave 58 feet per minute; without the grating, 133 feet per minute, outwards.

On the 27th, the wind was N. E. about 2 miles per hour; temperature in sewer,  $58^{\circ}$ , air,  $61^{\circ}$ , sewage,  $56^{\circ}$ . The current was up the sewer at the rate of 1.3 miles per hour. In the extension past the junction only a very slight upward current was apparent. Readings in a manhole gave 43 feet per minute with grating on, and 204 feet per minute without the grating, both outwards.

On the 28th, the wind at the lake was N. W. about 11 miles per hour, and in the sewer valley about  $3\frac{1}{2}$  miles per hour. Temperature in sewer,  $61^{\circ}$ , air,  $61^{\circ}$ , and sewage,  $57^{\circ}$ . The air current was down the sewer at a rate averaging 1.1 mile per hour. There was no current either in the Dover court or in the extension sewer. Readings in the

<sup>1</sup> Proc. Inst. C. E., vol. lxxxiv (84)

covered manhole gave 69 feet per minute, and in uncovered 227 feet per minute, outwards.

On the 29th, the wind was N. W. about 7 miles an hour at the lake, and in the valley 5.4 miles per hour. The temperature in sewer was 57°, of air, 62°, of sewage, 58° Fahr. The current was up the sewer and at rate of 1.6 miles an hour. In the Dover Court sewer the current was at the same rate. In the extension a slight current upwards was discernible. Readings taken in the manhole covered gave slight currents both up and down, and with manhole uncovered an upward current of 308 feet per minute.

On Friday, October 1st, the wind was from N. to N. W., at the lake 5 miles, and in the valley 2.8 miles per hour. Temperature of sewer was 54°, air, 44°, of sewage, 49°. The current in the sewer was upwards at 0.4 miles per hour. In the Dover Court sewer the current was downwards, and at the rate of 1 mile per hour. There was no current in the extension. Readings in the manhole, grating on, gave 46 feet per minute, and with grating off, 295 feet per minute, both outwards.

The want of circulation in the upper part of the sewer is perplexing, and is slight evidence that a sewer may be laid like a water-pipe, with a circulation all round, and yet not circulate the air. The difference of current in manholes with the gratings on and taken off shows that the friction of air is too great, and that the full benefit is not obtained from the present form.

These observations are not offered as complete or conclusive. They are the commencement of what the author hopes to be a series extending over some months. They demonstrate the practicability of obtaining a current through a sewer, and are offered in the hope that other observers may be induced to follow out this interesting inquiry.

Ventilation through house-drains, with pipes discharging above the roofs, is no doubt the most satisfactory means of disposing of sewer gases. If the plumbing by-law now before the city council becomes law, overhead ventilation will receive a great impetus. Shafts have been built against the sides of houses with considerable success. It is important to place the shaft in such a position that it can be heated by radiation from the walls. An experiment the author saw of carrying up a galvanized iron pipe at the end of a sewer on a steep street would not be likely to be successful, as the pipe had no heat imparted to it.

The most troublesome sewers for sewer-gas are on Simcoe and Sherbourne streets. The former is one of the oldest of the city sewers, and follows the course of an old beck or water-course. In southerly and south-easterly winds the pressure of air in the sewer seems to be very great, as there are good grounds for believing that the sewer air is forced into the houses. In the majority of the houses the plumbers' work has been executed prior to the date of fresh air inlet and soil pipe ventilation.

Sherbourne street sewer, which is of comparatively recent construction, is another troublesome sewer. In the upper part of the street the man-sions are of the newest and most modern design; they are some of the

handsomest residences in the city. The subsoil is nearly all sand, yet still there are great complaints of sewer air entering the houses.

Private drain connections are nearly always trapped outside of the house, with a fresh air inlet or foot vent, the soil pipe being carried up through the roof full size, and frequently a size larger.

The author was informed not long ago by an architect enjoying one of the largest practices in this city, that in a house which he had built, with fresh air inlet at foot of soil pipe, all the traps properly ventilated against syphonage, and the soil pipe carried up through the roof full size, the traps were forced!

A fresh air inlet at the outside of a house, placed under a rose-bush, was shown to the author a few days ago. The bush was considerably damaged, and killed apparently, by sewer air. This is in a street with manholes over the sewer. It was a surprising revelation of trap-forcing, for the air can hardly have come out of the house drain, as it was laid last year under his supervision.

In very cold winter weather the upper ends of soil pipes condense the mixture arising from the pipes, frequently closing the extension completely. The author finds the basket cowl the best form for our climate.

Sewer ventilation has to be treated like tunnel or mine ventilation. A sewer with a number of laterals is like a mine with a number of main and branch workings, or a very long tunnel, at the ends of which different meteorological and physical conditions exist. For instance, one shaft at the head of Sherbourne or Simcoe street would not be likely to create a draught throughout the sewers under their existing arrangements.

Manufacturers are chary of allowing their chimneys to be used for shafts from sewers. There is so much prejudice against shafts being built alongside of private property, that the problem seems as if it would never be fairly worked out. If manufacturers would agree to pass their waste steam through a shaft especially designed for ventilating purposes, instead of turning it into the sewers and increasing the tension of the atmosphere in them, they would greatly forward the solution of sewer ventilation.



## VIII.

### MEDICAL SCIENCE ON THE ABUSE OF ALCOHOLICS BY THE HEALTHY.

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While impure air, befouled as it so often is by ordinary pollutions as also by the poisons of specific diseases, holds the first place among the causes of avoidable disease and death, the second place probably belongs to the abuse of alcoholics. There are two other considerations which render the presentation of this subject by the sanitarian exceedingly important. Religion, morality, and even politics mingle their cries with the voice of hygiene, and give birth to partisans, who, misled by sentiment and prejudice, pervert the facts. Farther, modern research is constantly contributing to our knowledge additional facts, and a recapitulation from time to time of the subject, especially of the facts bearing on the questions most discussed, is a duty owed by hygiene to the public. With this view, the following article is contributed. It attempts to present in untechnical terms, for the benefit more especially of non-medical readers, the facts concerning the abuse of alcoholics by the healthy, as taught by medical science, and particularly by physiology, pathology, and hygiene.

The first question to be considered is, *What are alcoholics?* All drinks containing alcohol are called alcoholics, for they owe their power and their use to the alcohol they contain. They are divisible into three chief classes, viz. : malt liquors, as beer, ale, porter ; wines, as claret, hock, champagne, sherry, and port ; and spirits, as whiskey, brandy, rum, and gin.

Spirits, often termed ardent spirits and distilled spirits, were formerly called "strong waters," and by our Indians "fire-water." All spirits are products of distillation, while the much simpler and much older process of fermentation produces wines and malt liquors. These last contain least alcohol ( $1\frac{1}{2}$  to 10 per cent., and averaging less than 5 per cent.), and are therefore the least injurious ; spirits contain most alcohol (40 to 60 per cent., whiskey and brandy containing about 50 per cent.), and are the most injurious ; and wines contain much less than spirits (8 to 25 per cent.), and are much less injurious. The various alcoholics differ one from another in important particulars ; but the ques-

tion of much the greatest consequence respecting any given alcoholic is, What amount of alcohol does it contain? This has been sufficiently answered for my purpose.

#### PHYSIOLOGY. HISTORICAL.

The physiologist, investigating the influence on man of anything, seeks instruction from the history of its use. Therefore, a few facts on this subject will be cited. The Fire Worshippers and Brahmins, in the earliest dawn of history, sanctified the "moon-plant," which yielded an intoxicating juice; they declared it a gift of the gods, and employed it in sacred rites. Wine and beer have been in use as far back as man's historical records extend. Egyptians, Greeks, and Romans regarded these intoxicating drinks as given by the gods to drown care and to stimulate dulness into ecstatic pleasure. They gratefully ascribed these gifts to special gods, whom they represented reeling drunk with sacred libations, and whose praises they chanted in drunken religious processions and at riotous feasts. Odin, Scandinavia's god, drank nothing but wine, and his Norsemen, dreaming of perfect bliss, imagined their Walhalla to be a heavenly paradise, where the happy souls of fallen heroes passed their days in battle and in the chase, and their nights in alcoholic revelry. From such nations much of our civilization has been derived; and this civilization was tainted with alcoholic abuse.

Has our religion specially tended to enforce abstinence from alcoholics? Out of all who lived before the Deluge, there was only one of the Hebrews, from whom our religion descends, who "found grace in the eyes of the Lord" because of his "righteousness." Yet, as soon as the fall of the murderous flood permitted, the miraculously rescued Noah "planted a vineyard; and he drank of the wine, and was drunken." Further, the righteous Noah, when he "awoke from his wine," said to his son Ham, the father of the people of Canaan, "Cursed be Canaan; a servant of servants shall he be unto his brethren;"—and thus our forefather cursed his own son and descendants, because, alas! *solely* because the son had failed to respect his father's drunkenness. After Noah's time, Solomon lauded wine to the Hebrews, as follows: "Give strong drink unto him that is ready to perish, and wine to those that be of heavy hearts; let him drink, and forget his poverty, and remember his misery no more;" and he also commended wine in that it "maketh glad the heart of man;" but added the wise king, "at the last it biteth like a serpent, and stingeth like an adder."

Christianity strictly enjoins temperance in all things. However, Christ consecrated wine to the use of his most solemn sacrament, and the beginning of those miracles which "manifested forth his glory" was the conversion, at his mother's request, of many (90 to 135) gallons of water into "good wine," for the gratification of the guests at a wedding festival. After Christ's time, St. Paul thus advised the elders of the church: "Drink no longer water, but use a little wine for thy stomach's sake

and for thy often infirmities ;” and physicians still teach that alcoholics are serviceable, especially in the debility of old age.

Three religious faiths now share with Christianity the allegiance of the great masses of mankind ; the Buddhists outnumber Christians, and the Brahmins and Mohammedans combined equal them. One of Buddha’s ten commandments forbids the use of intoxicating drinks, the Brahmins denounce their use as one of their five great sins, and Mohammed prohibited such drinks as an abomination. While the followers of these faiths indulge in the more baneful vice of intemperance in opium and in hashish, they are comparatively free from alcoholic intemperance, a vice which especially characterizes Christians.

Although wine and beer have been used and abused in all times, yet spirit drinking is a comparatively modern vice. Alcohol was not discovered until the seventh century ; the distillation of spirits from wine was not discovered until the twelfth century, and spirits did not come into common use as drinks until the fifteenth, sixteenth, and seventeenth centuries, the period varying with different nations. The earliest records I have found as to the use of spirits are as follows :—Some time after 1450, distilled spirits first came into use in Sweden, and they were abused to such an extent that in 1494, and repeatedly thereafter, their use was prohibited by law. About 1520, the Irish usquebaugh, or whiskey, began to acquire reputation in England. Prior to 1616, spirits must have been known in Spain, as Cervantes’s Sancho Panza got into trouble through Jamaica rum. In 1650, the Connecticut Blue Laws restricted the sale of beer, wine, and “*strong water*.” Not until about 1655 did the consumption of French brandy become great in England, and Jamaica rum not until 1688. The historian Macaulay states that about 1692, a year of hard times, punch made of brandy and lemons began to be used, instead of wine, on the tables of the English gentry ; however, Thackeray’s “*Henry Esmond*,” which depicts their social life from 1691 to 1718, is full of drunkenness, but not with spirits.

The English words brandy and whiskey are probably less than three centuries old, and the common use of these articles as drinks is less than two. Finally, it deserves notice that whiskey is derived from a word which signified “the water of life,” and that to this day the French, the Italians, and some English medical books continue to designate brandy by words which also signify “the water of life.” Thus, from the earliest times to the present, men have been in the habit of regarding alcoholic drinks either as god-given or as life-giving blessings to mankind.

This brief historical sketch renders it obvious that for many centuries our forefathers have imbued their descendants with faith in the health-giving virtues of alcoholic indulgence. Who can expect the results of such long-continued convictions and customs to be eradicated easily or promptly, and what wonder is it that men continue to credit alcoholics with many virtues which they do not possess?



## INSTINCT FOR ALCOHOLICS.

So long and so general has been the use of alcoholic and other stimulants, that most authorities, even some distinguished physiologists, have hastily attributed this use to a "universal and imperious instinct." Man has not been diabolically cursed with any such instinct; he has no instinct which is not possessed by other animals, and all these have a natural aversion to alcoholics. They are repulsive to children, unless disguised by mixture with sugar or other harmless substances for which the child has a natural appetite. Our Indians, the Australians, the Hot-tentots, and other savages, cultivating neither grain nor fruits, and ignorant of the processes of fermentation and distillation, lived in health without alcoholics and without any instinct for them, until civilized white men taught them how a healthy aversion could be perverted by vicious habit and even debased into an overpowering morbid appetite. Millions of civilized white men and a much greater number of women have proved, by healthy, happy, laborious, and prolonged lives, that milk and water are the only fluids essential to man, and that alcoholics are not only unnecessary, but also are not instinctively sought for. It is, then, very certain that man's love for alcoholics is not an instinct, in the proper sense of this word.

However, the desire for alcoholics, though not itself an instinct, has its origin in the most powerful and beneficent instinct which man possesses in common with all other animals,—the instinct which prompts animals to seek pleasure and to avoid pain. While stoics, ascetics, and other moralists have taught that man should avoid pleasure and welcome pain, physiologists insist, on the contrary, that the welfare of body and mind and the preservation of life itself depend on our guidance by the promptings of pleasure and of pain. While pleasure teaches what we should seek, pain has two uses: first, it serves to reënforce the lesson of pleasure when its promptings have been disregarded; and, second, pain teaches us what must be avoided in order to preserve health, life, and happiness. While many complainingly wonder why a merciful God should have afflicted man with pain, physiologists wonder, on the contrary, how animal life could possibly exist without it. Consider the following facts: Pleasure or desire for pleasure prompts man to eat, to drink, to breathe, to sleep, to take exercise, to seek warmth, to beget children, and even to follow the road to heaven. If pleasure fails to induce us to obey its promptings, then nature forces us to obedience by the pains of hunger, thirst, suffocation, exhaustion, indisposition, cold, and lust. Farther, pain or desire to avoid it keeps the burnt child out of the fire, it teaches us to protect ourselves from all bodily injuries, to restrain injurious excesses of pleasure, to avoid all causes of mental distress, and to hold back from the agonies of hell. Pain is the greatest of all the teachers of duty and of respect for the rights of others, as is illustrated by the proverb, "Spare the rod and spoil the child." Pain itself, whether of body or mind, impairs health and happiness, while pleasure promotes

them. Therefore, it is right to do that which in most things we all habitually do do, namely, obey the promptings of present pleasure and of present pain.

However, the conditions of existence are such that all animals are at times so circumstanced that at one time they must forego present pleasure in order to avoid future pain, and at another time they must endure present pain in order to secure future pleasure. Civilization has constantly tended to increase the struggle for existence, and therefore the number of the conditions which necessitate the sacrifice of present pleasure and the endurance of present pain in order to secure a larger amount of pleasure in the future; and those who fail to practise this lesson of self-denial will find that either they or civilization must go to the wall. Hence the savage, who had lived in cities, returned to his woods declaring that he had "tried civilization and found it was not worth the trouble."

For such reasons, physiologists teach that a beneficent law of nature requires man to be guided by the promptings of pleasure and of pain; but that circumstances frequently force him to disregard these promptings for the time being, in order that he may in the future avoid more pain than he temporarily endured, and secure more pleasure than he temporarily sacrificed. The wise man will calculate well the chances, and will be led where he believes, after due consideration of both the present and the future, that the greatest pleasure and the least pain will be found.

If I have taught the truth, then it is plain why men "put an enemy in their mouths to steal away their brains." Have not men been taught, from the earliest times, that alcoholics give pleasure and drive away pain? Solomon, twenty-eight centuries ago, sang of wine, that it "maketh glad the heart of man;" "Let him drink and forget his poverty, and remember his misery no more." In this century a great poet has sung of whiskey,—

"'T will make a man forget his woe,  
'T will heighten all his joy."

And all remember the cause why, though

"Kings *may* be blest, Tam was glorious,  
O'er a' the ills o' life victorious."

Our best prose and poetry bedeck alcoholic abuse with their brightest gems of wit and merriment. From childhood, jolly voices have tempted us with such rollicking songs as "Dum vivimus, vivamus," and "We won't go home till morning;" and thousands of children are still being constantly misled, by precept and example, at home and abroad, to regard alcoholics as man's best companion in pleasure and his most trusty panacea in sorrow and in pain.

So long as men believe that alcoholics increase pleasure and lessen pain, they will drink them. Nothing can stop their abuse except a profound and universal conviction that all the immediate pleasure given and

all the pain momentarily taken away are far more than counterbalanced by the pain ultimately inflicted. Before considering the evidence that infinitely more pain than pleasure comes from alcoholic abuse, it must first be inquired, What constitutes abuse?

#### ABUSE OF ALCOHOLICS.

It is only within recent years that science determined, with something like accuracy, what constituted an abuse of alcoholics. Repeated experiments, on robust, healthy men, have proved that not even the strongest of these can exceed in a day more than two ounces—that is, only four table-spoonfuls—of alcohol, without diminishing their capacity for work, and therefore their usefulness and health. If not subjected to severe tests, strong men may for a long time take a larger quantity without apparent, but not without real, injury. Whoever does not die before his time, and yet habitually drinks more than two ounces of alcohol daily, will very surely have to pay for it in pains far harder to bear than those inflicted by payments in cash. While two ounces daily are the maximum, strict moderation or temperance requires that even strong, healthy men should not exceed one and a half ounces of alcohol daily. This amount is equivalent to the following quantities of our ordinary alcoholics, namely, to one and a half pints of beer or ale; to three fourths of a pint of claret, champagne, and hock; to seven ounces of sherry or port; and to three ounces, or only six table-spoonfuls, of whiskey or brandy.

These small quantities will be derided by every old toper in the land, and by many, too, who are not toppers; but derision can never refute scientific experiments and observations carefully and skilfully made. How much these quantities are generally exceeded appears from the fact that there are many men, who, though never drunk in their lives, and therefore are now considered moderate drinkers, yet daily or frequently double and even treble the quantities above indicated as the maxima permitted by strict moderation. All these are wasting their vital capital; and the day will come, as surely as they live, when they will collect smaller dividends of health, and at last be taught what bankruptcy of life before a man's time means. Science has not as yet gathered proofs that any injury to health and life is inflicted on the majority of those who do not abuse alcoholics by exceeding strict moderation, as above defined. But science is not needed to warn us that the transition from strict moderation to injurious indulgence is frightfully easy;—so easy, that while no one intends to become a drunkard, yet many do; so easy, that not even the temperate habitual drinker can consider himself safe unless he applies to himself, at least once a year, the test of total abstinence. Alcoholics are so seductive that they tempt to excesses even the wisest and most resolute men, who, if they indulge habitually, are forced to endure for self-protection the pain of frequent self-denial, which largely counterbalances all the pleasure they receive. Most men are neither wise nor resolute, and, incapable of the requisite self-control, illustrate in multitudes that “Fools rush in where angels fear to tread.”



## ALCOHOLICS AS STIMULANTS.

In medicine, alcoholics are termed stimulants; and it unfortunately results that most men, and even some doctors, think that this means that alcoholics give a man strength. One of the highest medical authorities correctly defines stimulants to be medicines "which seem to increase our vital powers for the time being, and thus give us feelings of greater strength and comfort." Now, alcoholics do seem to give a man strength, and so does a spur seem to give a horse strength; but, in fact, alcoholics no more give strength than the spur. The spur irritates the horse to use, and therefore to show for a moment, more of the strength which he already had than he would otherwise have done; but, if a good horse, the more he is irritated by the spur the sooner will his strength be exhausted. Alcoholics affect a healthy man as the spur does a good horse: however, the alcoholic spur usually exhausts a man's strength much sooner than the iron spur exhausts a horse's. The common belief that alcoholics give a man strength is as groundless as would be the belief that strychnine gives strength because it produces violent convulsions; or the belief that irritation of a chicken's spinal cord, by wringing its neck, gives strength to its jumping, headless body. Alcohol intoxicates and influences all animals as it does man; and repeated experiments have proved that it requires but little alcohol promptly to benumb and paralyze both muscle and nerve, the two tissues on which strength depends.

Chloroform, chloral, and ether stimulate like alcohol; and all four are also anæsthetics or pain-killers, and narcotics or sleep-producers. Alcohol exceeds the others in the greater duration of its stimulating action, and in the much larger quantity required to produce insensibility, unconsciousness, and death. In fact, the great prevalence of alcoholic abuse is due to the superiority of alcohol over all other substances in the fact that there is nothing else which cheers so long with so little detriment to the body. The extent to which its abuse can be frequently repeated, without apparent detriment, is often astounding; and, unfortunately, the worst bodily injuries which alcohol inflicts are usually separated by such a long interval from the first abuses which originated them, that the victim is apt to be deluded into the suicidal belief that his abuse of alcohol has not been the cause of his ailments. Hence, it is very difficult to convince those who drink, especially inexperienced youths, that alcohol, when abused, is an exceedingly sure poison, however slow its action may be. It is equally difficult to convince beginners that alcohol is so insidiously seductive, that the habit of indulgence stealthily gains possession in spite of the indulger's intention and determination to the contrary; and that the habit, once formed, binds the victim with the strongest and cruelest "hooks of steel."

There is abundance of evidence that, although alcoholics *seem* to give strength, they in truth do not; and therefore, though useful to the sick, they are unnecessary to the healthy, constituting for these no more than

an agreeable luxury,—a luxury which has done more harm than any other indulged in by civilized Christians. Prior to and within this century, circumstances have repeatedly forced men totally to abstain from alcoholics at times when they were long subjected to the most arduous labors men have ever undergone. The longest marches, the most exhausting sieges, the most trying expeditions by land and by sea, now at the equator and now at the poles, have been endured by men without alcoholics; and the testimony is unanimous that all these trials have been endured better without than with alcoholics. Recently, on March 15th, 1884, a little man weighing 138 pounds, Weston, the champion of pedestrianism, and a mighty champion of total abstinence, finished the unprecedented feat of walking 5,000 miles, at the rate of never less than fifty miles a day; and this extraordinary bodily labor was completed, though begun when he was in bad condition, and though he suffered throughout with a sore heel. No abuser of alcoholics will ever prove their usefulness to laboring men by surpassing Weston. In fact, there are but very few occasions when a *little* alcohol may be useful to a laboring man. It may enable him, if taken a half hour before the close of an exhausting day's labor, the better to finish it; it may comfort and revive him if taken at the close of an exhausting task; and it may help to warm and restore him after exposure to intense cold. If the laborer could reserve alcoholics exclusively for such emergencies, sanitarians would not complain.

Bodily labor is certainly best done without alcoholics, but how is it with mental labor? On this subject Mr. Reade published, in 1883, a book which contains the evidence written by 132 of the men most distinguished in science, literature, and art, now living in Europe and America. The conclusions from this evidence are as follows: The only pure brain stimulants are fresh air, water, food, exercise, and bathing; alcohol is of no value to a healthy student; all work under its influence is unhealthy work, and the most vigorous thinkers and hardest brain-workers abstain. The very strong evidence on which these conclusions are based was not needed to convince me of their correctness. For it is my experience that alcoholics are even less needed by brain-workers than by muscle-workers.

Since, then, both bodily and mental labor are better done without than with alcoholics, it is manifest that the healthy do not require them, and would be better off if they denied themselves entirely so dangerous a luxury. Such is unquestionably the conclusion of modern science. The value of alcohol as a medicine is equally unquestionable, and yet it is still common to find doctors who over-estimate its value, and encourage its abuse by the sick.

#### ALCOHOL AS A FOOD.

Alcohol could not give strength except by nourishing the body as a food; and since it is composed of the same chemical elements as sugar, it would not be strange if alcohol were a food, serving, as sugar does, to

make fat and heat,—two services indispensable to life. If alcohol makes fat, then surely it is unhealthy fat; for it notably tends to cause the same fatty degeneration of the organs of the body which old age causes, to the great detriment of health and life. If alcohol makes heat, then, in doing this, it must interfere with the natural healthy process of making heat; for alcohol promptly causes a decrease in the temperature of the body. Hence, if alcohol be a food, it is certainly an injurious one, which, instead of promoting, impairs healthy nutrition. It is notorious that indulgence in alcohol is apt to cause a constantly increasing craving for it; that, if much be partaken of, even with every variety of food, sickness and death result; and that neither sugar nor any other healthy food injuriously acts in this wise.

Alcohol certainly lowers the temperature of the body, notwithstanding the common belief that it keeps up heat and keeps out cold. Hence alcohol is exceedingly dangerous to those long exposed to severe cold, and blankets or artificial heat are necessary to the health of none more than to that of drunkards, when asleep or at rest. How does alcohol decrease animal heat? Doubtless by means of two of its chemical characteristics. In the first place, alcohol is so greedy of water that it robs all the tissues of some of the water indispensable to the healthy discharge of their duty,—thus causing the thirst which torments the abusers of alcoholics; and, in the second place, alcohol coagulates the tissues. By such means the red blood corpuscles are so altered that their heat-making and life-giving function of carrying oxygen to the tissues is impaired. The inevitable results are not only the generation of less heat and less vital force, but also the removal of less of that effete waste of the tissues, which, when retained, poisons the body. Alcohol certainly diminishes (says Alf. Carpenter and others) the excretion of urea, of carbonic acid, and of bile.

But if alcohol reduces heat, why does it cause the *sensation* of warmth, and why does it increase slightly the heat at the surface of the body for perhaps a half hour or less? Sensations of heat and of cold are due, the one to an increase, and the other to a decrease, of the flow of blood in the skin, and as alcohol increases this flow, the sensation of warmth results. Further, the greater quantity of heat-giving blood in the skin raises its temperature; but the blood at the surface parts quickest with its heat, and more blood in one part means less blood elsewhere, so that, while the heat is increased at the surface for a short time, the heat of the blood *en masse* is decreased from the beginning.

The inquiry now arises, How does alcohol increase the flow of blood to the skin, and probably to the brain? The quantity of blood in a part varies with the calibre of its blood tubes, and variations of calibre depend upon the action of the nerves (vaso-motors) of these tubes. Whether these nerves be paralyzed or inhibited, the tubes relax and thereby enlarge their calibre, thus securing an increased flow of blood through them. The heart, relieved by these relaxed tubes from the resistance previously given by their contraction, beats quicker and at times even



stronger, just as the main-spring of a watch quickens its action when the ordinary resistance to it is removed. Hence, it now seems to the physiologist that even the increased action of the heart is brought about indirectly by a paralysis or a benumbing of nerve force. It is certain that alcohol forces the heart to do an immense amount of useless and exhausting extra work ; and I doubt not that this is due either indirectly to nerve paralysis, or directly to a poisonous irritation of the nerves of the heart.

The cheerful exhilaration and the wild excitement caused by alcohol seem to indicate an exaltation of nerve force. None the less, analysis of all the phenomena tends rather to prove that nerve force is really diminished. Reason and moral sense, the sole functions in which man surpasses the brute, are the highest manifestations of nerve force, and its lowest manifestations are found in the functions of circulation and respiration, by which there is maintained in man the same lowly life which a vegetable enjoys. Now it is manifest that alcohol begins at the top and benumbs nerve force, step by step, downwards to its lowest function. Reason is quickly so weakened that the power to follow out the successive steps of a difficult argument is strikingly impaired. Soon, too, reason lessens or loses its control over the emotions and the imagination ; and the result of this loss of control is, that the emotions and imagination riot in their escape from restraint, as shown by laughter, tears, rage, and wild fancies, and by words and acts which prove a lowered moral sense. That reason is weakened is also proved by the fact, that the true relationship of the victim to surrounding objects is so ill appreciated that he becomes foolhardy and ridiculous. While the higher brain functions are being gradually and chaotically disordered, a lower function begins to show that it, too, is becoming impaired, namely, the function of coördination, that function by which we adjust numerous muscles to act in such concert that we stand erect without losing our balance, and walk without staggering, reeling, and falling, as the drunkard does because of his impaired coördination. Finally, every power of the brain is lost, except the one on which depends the continued action of the heart and lungs, and even this power may at last be paralyzed, whereon death ensues. All admit that tremulous or convulsive movements and emotional excitement indicate depressed and not exalted nerve force, and, for the reasons now stated, physiologists teach that alcoholic abuse tends, from first to last, to weaken and paralyze nerve force and not to exalt and strengthen it. The sensations of strength and warmth, like many other sensations known to physiologists, are in this instance delusions, and these sensations, together with the emotional excitement caused by alcohol, are in any case no more than wasted force.

#### PHYSIOLOGICAL PATHOLOGY OF ALCOHOLISM.

The phenomena of acute and of chronic alcoholism, the one due to occasional and the other to habitual intemperance, now deserve attention. Acute alcoholism is divisible into the three obvious stages, of exhilaration,

of excitement, and of insensibility ; but it will serve my purpose better to subdivide it into the *four* stages too often seen in those who are first exhilarated, then jolly drunk, then beastly drunk, and at last dead drunk.

*First Stage.* Two ounces or less of alcohol, taken by those who have not, through habit, established a vicious tolerance for it, cause exhilaration. The heart, forced by alcohol to throb vigorously, floods the skin and brain with blood. A vigorous circulation, however induced, causes sensations of warmth, strength, and pleasure so generally that it is common to say that "the heart beats high with hope," and that "the pulse throbs with joy." Thus alcohol imparts to the drinker a *sense* of comfort, cheerfulness, and renewed animation ; the emotions and imagination are quickened, and thought flows more swiftly. But reason or judgment—our highest brain function—is weakened, as is illustrated by the facts that control over a train of thought is impaired, and that while literary composition is more rapid, it rarely proves, on sober second thought, satisfactory even to the writer. The heat of the body may be slightly increased for some minutes, but it soon decreases, although the sensation of warmth may deceitfully persist for a longer time. The eyes become brighter, the face is flushed, and the tongue wags with glibber fluency ; and it here deserves special notice, that a flushed face and a wagging tongue are danger-signals to warn the wise that they have gone too far and should go no farther.

There is as yet no conclusive evidence that moderate exhilaration, if it be neither exceeded nor repeated too often, inflicts any bodily injury. However, the smallest quantity of alcohol injures the healthy as well as the sick, if, as is often the case, it lessens appetite, or causes dry skin, headache, restless sleep, or disinclination to work. Alcohol injures least when taken, much diluted, with food, with fresh cold air, and with exercise.

*Second Stage.* When more alcohol is taken than suffices to cause exhilaration, the man becomes jolly drunk ; with more, beastly drunk ; and with still more, dead drunk. The quantity needed to make a man jolly drunk causes, unfortunately, thrills of intense pleasure in many, and these are specially tempted to abuse alcoholics and to become habitual drunkards. In this stage the temperature is so lowered that exposure to severe cold is very dangerous. The poisoned brain is so weakened that the emotions and imagination, escaping from the control of benumbed reason, become riotous. The man is apt to revel in a childish joyousness, and in loss of self-control and in strength of emotions he resembles a spoiled child ; like one, he is not continuously joyous, but at times tearful, and again "fighting mad." Reason has left the fountain of the emotions unclosed, and "gush" of some sort must flow. Men ridicule the sentimental gush of emotional women, but God pity the thousands of decent women forced to endure the drunkard's gush ! Coördination soon becomes so affected that ability to "walk a chalk line," to thread a needle, and to do other such acts, is impaired. The nerves of the lower lip and of the tongue become so benumbed that they bungle over their

work, and articulation becomes thick and halting. Finally, if nature has not been too often abused, the crying, fighting, hiccuping, jolly drunkard becomes giddy, faint, and sick, and his outraged stomach violently but luckily rejects the poison, leaving him painfully to realize the next day that, in very truth, he is a most miserable sinner.

*Third Stage.* This stage, beastly drunkenness, differs from the preceding chiefly in the aggravation of the symptoms. The temperature is lower, the eyes are more bloodshot, and speech has become more inarticulate. Coördination is so impaired that the victim's gait becomes more unsteady, he reels and all things about him seem to reel, he staggers, clings to a lamp-post or the nearest object for support, and at last falls "under the table," or stumbles into the gutter. Reason and will are so completely off duty that the imagination is in wild disorder, and the unrestrained emotions disclose without shame the most brutal impulses. Alcohol does not inspire a man to be, but it will reveal if he be, a bully, a coward, or a blackguard. The man, first lowered to a child, has become a brute, often without the decency of even a trained dog. The nerves of touch, taste, smell, hearing, and vision become so perverted that they carry false impressions to a brain now incapable of appreciating correct impressions, and thus arise odd and ludicrous fancies, which force laughter even against one's will.

There are men to whom a drop of alcohol is as a drop of blood to a tiger, and these, as well as some others, are apt to become, instead of beastly drunk, crazy drunk, suffering with veritable *mania à potu*. In this condition they are terrible members of society, often committing crime, and always carrying fear and disaster everywhere, especially to the helpless, innocent, and despairing victims under their control. They recover with remorse, repent, take the most solemn vows, and break them,—relapsing again and again.

*Fourth Stage.* This stage, dead drunkenness, is characterized by a profound sleep of insensibility, unconsciousness, and relaxation of the muscles, due to a poisonous and almost complete paralysis. Heart and lungs alone continue on duty, and the god-like man, reduced first to a child and then to a brute, has now become a mere vegetable, and an exceedingly offensive one. If heart and lungs fail, which, strange to say, they rarely do, death removes the drunkard from a world where he reaps more pain than pleasure, and where he does to others more harm than good.

#### CHRONIC ALCOHOLISM.

Occasional indulgence tempts to habitual indulgence, and this often leads to occasional or daily abuse. Every abuse tends to benumb nerve force, so that more and more alcohol is required to produce the cheerful exhilaration which moderate indulgence originally induced. Hence any indulgence in alcoholics is perilous.

Many habitual drinkers exceed strict moderation, who, however, never get drunk, and therefore are now considered moderate drinkers. None



the less such so-called moderate drinkers are more apt to be injured ultimately than are those who, habitually abstaining, do indulge in an occasional "spree." Of course the evil results of habitual abuse vary, much depending on the extent of the abuse and on other circumstances. However, there are some symptoms common to all cases, and deserving attention for the special reason that they are often misinterpreted by the victim. He feels that he is ailing, perhaps breaking down, but so deludes himself as to the cause that he will even resort for relief to larger doses, to soda and brandy, to mixing his liquors, to less fruity wines, or to some other such expedient, which merely "piles on the agony." The extent to which a man, otherwise sensible, can delude himself as to the effects of alcoholic abuse is astounding.

A headache is one of the most frequent results of abuse, and yet a sensible man will urge another to partake of some favorite tippie, with the assurance that there is not one headache in a jug-full. Should headache follow, this is confidently attributed to some such nonsense as to the sugar or lemon in the drink, or to the drunkard's favorite scapegoat, the much maligned liver. True, this organ is the first to receive from the stomach its alcoholic contents, and it rebels against them; but he who will refrain from alcoholics, will soon cease to find cause to complain of either liver, or sugar, or lemons. Many thousands of men pass their lives in an abnormal, unhealthy condition, without recognizing that this is due to habitual alcoholic abuse; and among the symptoms from which few altogether escape, and which are frequently misinterpreted, are the following:

A dry mouth, coated tongue, thirst, diminished appetite especially for breakfast, a longing for alcoholics rather than for food, acidity, heartburn, eructations, constipation, nausea, vomiting, and a dropsical abdomen denote that the digestive organs are rebelling against their abuse. The over-worked heart rebels with a feeble circulation, cold extremities, palpitations, and a "sense of sinking." The abused skin rebels with dryness or clamminess, with flushings at one time and pallor at another, with "bloat," with a "blotched red nose," with "grog-blossoms," and other eruptions. The abused muscles rebel with tremblings especially of the extremities, with sudden jerks above all at night, with indisposition to exertion, and with easily caused fatigue. The abused nervous system, most sensitive to alcohol, cries out its warnings with sleeplessness or restless sleep, with headache, giddiness, buzzings in the ear, queer numbness and prickings especially in the palms and soles, and with neuralgias. And the brain adds to these warnings languor, low spirits, irritability, vacillating irresolution, distrustfulness, slothful indolence, reckless thriftlessness, profligacy, and untruthfulness. Self-control and self-respect are gradually lost, ambition, honor, and conscience are less and less regarded, and the victim becomes as reckless of oaths as he is of the tears and misery of those who love him.

Of all the evil results of habitual abuse, not one is so disastrous and hopeless as the gradual development of a constant craving for some stim-

ulant. When the laws of health have long been persistently abused with stimulants, there results an abnormal condition of lowered vitality, in which healthy instincts are gradually perverted into misleading appetites. The abused body at last gets into such a morbid condition that there is depression without alcoholics, but cheerfulness with them. The victim longs for them, and feels better with them; he mistakes this feeling for a proof that the longing is a healthy instinct; and he is thus deluded into the fatal belief that alcoholics are not only good for him, but absolutely necessary. He must have his drink at night to put him to sleep, and early in the morning to arouse him to effort. I have never seen a young man in this condition who did not become a confirmed drunkard. He slowly commits a suicide which would torture himself and others less if done more promptly.

A constant craving for drink becomes the more disastrous as soon as it is associated, as sooner or later it always is, with little or no appetite for food. The pure blood, which gives health and life, requires bread and meat to make it; it cannot be made out of alcohol, substituted for these, and whenever this frequent experiment is tried, the brain shrieks out, with "the horrors" of delirium tremens, that it refuses to do its work with such poisoned blood. There is no cure except cleansing the blood of its perilous stuff.

The self-indulgence which habitually abuses alcoholics, and thus originates a constant craving for them, is certainly a vice, for there is a time in every one's life during which he has enough will to abstain; but this vice so weakens the brain that at last the strength of will, necessary to resist the craving, is destroyed, and the disease, dipsomania, is established.

Having considered some of the evidences of alcoholic abuse given by the living, the evidence given by the dead will now be briefly considered.

#### PATHOLOGICAL ANATOMY.

The most frequent and important lesions found in the bodies of dead drunkards are of the same nature as those produced by old age. Fibroid, fatty, and chalky degenerations gradually invade the tissues and unfit them to maintain health and life. By these degenerations vital force is prematurely lowered and exhausted, and the constitution is so impaired that there is far less power to resist disease. So that it is notorious that the abusers of alcoholics greatly increase their liability to death by accidental injuries, and by epidemic and other diseases; and that, if these fail to shorten their lives, decrepitude, old age, and death come on before their time.

Diseases of the liver and other organs of digestion cause four times more deaths among the intemperate than among the temperate; diseases of the kidneys, twice as many; pneumonia and pleurisy, diseases of the heart and blood vessels, and diseases of the nervous system all cause a marked increase in the number of deaths. The intemperate die in much

larger number than the temperate by atrophy, debility, diabetes, dropsy, calculi, congestion of the brain, apoplexy, and paralysis. And under such names the doctor conceals, for the sake of family and friends, thousands of deaths due really to alcoholic abuse. But the worst remains to be told, for surely no injuries are so shocking as those which parents transmit by vicious self-indulgence to helpless unborn children. It is a law of nature, as to living things, that they shall bring forth seed after their kind. In confirmation of this law, Aristotle taught that "drunken women have children like unto themselves;" Plutarch taught that "one drunkard begets another;" and Dr. Oliver Wendell Holmes, expressing the conviction of modern science, has wittily declared that "we are omnibuses in which all our ancestors ride."

One of the highest authorities in hygiene teaches that a "craving for drink may itself be inherited, or the thieving and cunning propensities, developed in the parent to obtain stimulants at all hazards, may become so intensified in the offspring as to render him a born thief and vagabond."

It is now beyond question that a disproportionately large number of drunkards' children become useless members of society; who are afflicted with a weak will, with mental debility, defective moral sense and depraved appetites; who are dwarfed or stunted in body and mind; and who suffer with impotence, hysteria, epilepsy, dipsomania, insanity, and idiocy. So great are the hereditary evils of alcoholic abuse that this generation would have been much inferior to what it is but for the three following influences, which have notably tended to enforce the law of "the survival of the fittest:" Mothers are more apt to transmit than fathers, and, luckily for mankind, our mothers generally have been for many centuries comparatively temperate;<sup>1</sup> further, alcoholic abuse greatly shortens life; and still further, it markedly lessens reproduction. The result is that the sins of the fathers can seldom be visited upon the children for more than the third and fourth generations, because, fortunately, no children are then left to breed another vicious crop.

#### VITAL STATISTICS.

Hygiene teaches how to preserve health, how to prevent disease. But in order to do this, the extent of sanitary evils and their causes must be known, and this knowledge is supplied, wholly or in part, by that handmaid of hygiene called Vital Statistics. Therefore attention is now solicited to some statistics concerning alcoholism. However, before presenting these, it is well to warn the reader that none of them have been derived from partisan advocates of the temperance cause, but all from the most recent medical authorities, who are special advocates solely of the cause of science.

Some benevolent unions are composed of members who are total abstainers, and many more are composed of non-abstaining members. Comparison between the two has shown that the sickness, the deaths, and

<sup>1</sup> The U. S. census of 1880 shows, says its former superintendent, the Hon. Francis Walker, five male deaths to one female death by alcoholics.



the expenses for both are, in all three items, more than twice as great among the non-abstainers as among the abstainers.

In one hospital where alcoholics had cost 83 cents per head, the quantity was so diminished in 1875 that the cost was only 23 cents per head, and therewith the death-rate decreased by 35 per cent. ; thus proving the well known fact, that even doctors have been in the habit of prescribing alcoholics too freely for the good of their patients ; which is not surprising, since it is notorious that many doctors take too much for their own good.

It has been found that about one half the patients in inebriate asylums have had drunken parents, and that hereditary drunkenness is most apt to manifest itself from fifteen to twenty-five years of age. It has been found in different insane asylums that alcoholic abuse is mixed up with the cause of insanity in from one eighth to one half of all the patients afflicted with this dreadful disease. So that two of the highest living authorities, Bucknill and Maudsley, declare that " intemperance in drink is by far the most potent of all removable causes of mental disease."

In 1883 the able doctors of the famous Harveian Society, of London, made the most thorough investigation ever yet made of the influence of alcoholics in causing death. They found that one seventh of all the deaths of persons over twenty years of age were due wholly or partially to alcoholics, and there is good reason to believe that the proportion is not less in the United States. However, life insurance companies, devoted exclusively to making money, have furnished the most convincing proofs of the influence of alcoholics in shortening life and causing death. Neilson's Vital Statistics furnish the following horribly instructive table :

	An intemperate person's chance of living.	A temperate person's chance of living.
At 20 years of age, . . . . .	15.6 years.	44.2 years.
At 30 years of age, . . . . .	13.8 "	36.5 "
At 40 years of age, . . . . .	11.6 "	28.8 "
At 50 years of age, . . . . .	10.8 "	21.25 "
At 60 years of age, . . . . .	8.9 "	14.285 "

This table conclusively proves that the jolly boys who seek through alcoholics " a short life and a merry one," realize with certainty the first half of their aim ; and no table is needed to prove that the intemperate insure themselves a less happy and useful life, and that when drunkenness and prosperity once shake hands they usually bid each other good-bye forever. To the ordinary causes of sickness and death there must be added the numerous accidental injuries to which drunkards are especially

liable. But accidents, sickness, and death greatly fail to represent all the suffering due to alcoholics, as will now be shown.

One half of the paupers of England are intemperate themselves, or are the children and wives of the intemperate. From one half to three fourths of all persons arrested and of all convicted of crime have their offences mixed up with intemperance. Wilson's Hygiene teaches that four fifths of the prison population are, directly or indirectly, the victims of intemperance; and a high authority asserts that one ninth of all cases of suicide are due to alcoholics. It has been proved in England that the number of the insane, of paupers and of criminals, varies chiefly with the annual expenditure for alcoholics.

Further, even these statistics of sickness, death, pauperism, and crime fail to portray the whole dreadful truth. The 35,000,000 population of Great Britain expend annually on their alcoholic luxury \$700,000,000, and employ 180,000 persons to traffic therein. Yet this waste of money is only a fraction of the enormous tax for alcoholics paid by the public;—it fails to represent the expenditure which alcohol imposes for such consequences as sickness, death, pauperism, and crime; for hospitals, poor-houses, and asylums, with their nurses, doctors, and druggists; and for jails, penitentiaries, and court-houses, with their policemen, juries, lawyers, and judges. Carefully itemizing all the losses of the United States from alcoholics, Dr. Hitchcock, president of the Michigan State Board of Health, estimated in 1876 that our annual loss "must equal or exceed \$2,000,000,000." This is equivalent to a tax of more than \$150 per annum on every male over twenty-one years of age residing in the United States.<sup>1</sup>

Further still, after exhausting statistics, large additions must still be made to the list of evils caused by alcoholics. For who can estimate the number or amount of such results as are suggested by the mere words, blighted lives, ruined prospects, business failures, domestic troubles, divorces, brothels, and gambling-hells? All know that alcoholics often have a mighty hand in all these evils.

The facts which have now been submitted are so appalling that they justify, in every lover of his fellow-men, feelings of fear, sorrow, and despondency. Are there not to be found some rays of hope to lighten up the dark and dreary picture which has been held up for your inspection? There are such rays,—enough to brighten the path of human progress, to justify the belief that man has in his nature more good than evil, to strengthen the conviction that good will ultimately triumph over evil, and to intensify the faith that a merciful God rules the world. Your attention will now be called to some of the compensations and consolations for the abuse of alcoholics, and to the means by which its many evil results are to be corrected.

<sup>1</sup> On the other hand, a report of the U. S. Brewers' Association asserts that in 1880 the U. S. treasury received for alcoholics \$68,265,196, and that this sum exceeded by \$51,000,000 all the expenses incurred in the support of the whole insane, pauper, and criminal population of the United States.

## COMPENSATIONS AND CONSOLATIONS FOR ALCOHOLIC ABUSE.

As one compensation for the evils of alcoholic abuse, political economy plausibly suggests that the surplus of our grain crops is now consumed in the manufacture of alcoholics; and that in case of a short crop, while there would be no surplus for alcoholics, there would still remain an ample supply of grain to protect the people from famine—an evil which repeatedly afflicted our ancestors more than the alcoholic evil afflicts us.

A second compensation is, that the treasury of the United States derived, during the five years, 1881–1885, from “spirits” and “fermented liquors,” an average annual revenue of \$87,776,553.

I have greater faith in a third compensation, derived from another source. What this compensation is, will be indicated by criticism of the following quotation. A temperance enthusiast has declared, that “The demon Alcohol is yearly dragging down to dishonorable graves hundreds of thousands of the brightest and fairest of our land.” The gross exaggeration of such a statement strikingly illustrates the proverb, “The devil is not as black as he is painted.” It is stated that alcohol kills “hundreds of thousands” annually. Now, the truth is that there are annually, by all causes, less than ten hundred thousand deaths of all the men, women, and children in the United States; that probably from fifty to ninety thousand deaths are due wholly or partially to alcohol; but that there is no satisfactory evidence that the number ever amounts to even one hundred thousand. None the less, this exaggeration is less gross than the statement that these “hundreds of thousands” are “the brightest and fairest of our land.” Are we to forget that the sun rises on the evil as well as on the good, and that the rain is sent on the unjust as well as on the just? Although I well know that some men having the highest principles, the ablest heads, and the tenderest hearts, become victims of alcohol, I am fully as well convinced that a majority of its victims are essentially weak and worthless specimens of humanity; and therefore I maintain that while alcohol does kill some of “the brightest and fairest,” it yet kills a much greater number of those who are the very reverse. Drunkards, as a class, are characterized by lack of the forethought which signals a sound brain, by feebleness of will, and by strength, where brutes are strongest, in emotions and impulses. They are civilization’s failures, and in the march of progress would become stragglers, burdensome to the advancing army, even if there were no alcohol. There are thousands of intemperate insane, paupers, and criminals, who if not intemperate would still be insane, be paupers, and be criminals. And, as to the last, sober criminals injure society far more than drunken ones. For these reasons, I believe that alcohol, spite of all its monstrous evils, does some good to posterity, by hastening “the extinction of the unfit” and fostering “the survival of the fittest.” This belief gains additional strength from my conviction that the proportion of good men to bad has increased



and is increasing throughout Christendom, notwithstanding its abuse of alcoholics for many centuries.

I find a fourth compensation in the fact that Christian nations rule the world in spite of the truth that they have always been, and still are, comparatively intemperate nations, and that the more northern and intemperate of these Christian nations excel the more southern and temperate. The intemperate Germans are superior to the abstemious Turks, and the intemperate Scotchmen and Americans are superior to the temperate Spaniards and Mexicans.

Attention is now called to some other facts calculated greatly to console pessimistic philanthropists. Temperance enthusiasts misrepresent these facts so often that I have given them special study, and shall present them at considerable length. They bear on the question whether intemperance has increased and is increasing in modern times. The great importance of this question depends on the fact that its correct decision involves right views as to the causes, and, therefore, as to the best remedies, for intemperance.

Although it is manifest to the student of history that civilized men have progressed, not only in science and the arts, but also in morals, yet there are various reasons why the ill-instructed majority should be predisposed to believe that intemperance and other immoralities have grown worse ;—in fine, that present times are bad, and that the “good old times” have passed away.

Childhood is proverbially the period of freedom from care, of hope, and of cheerfulness, while maturity and old age are the periods of care, of hope deferred, and of weariness of life. Therefore it is natural to communities, as it is to individuals when advanced in years, to claim that during their earlier days the times were better.

Another reason for the common tendency to believe that evils are increasing, is found in the fact that there have always existed evils, which, concealed from or unobserved by youth, are disclosed to the experience of advancing life so gradually that increase in a knowledge of evils is readily mistaken for an increase in their growth. Respecting intemperance, every year modern science furnishes new and stronger evidence of both the enormity and the extent of alcoholic abuse ; and every year the progress of education increases the number of those who are impressed by this evidence. It is natural, then, that the outcry against intemperance should increase, whether the evil be increasing or not.

A third reason for the popular delusion as to the “good old times” deserves notice. Early in life, when the strongest prejudices are implanted, all were encouraged to believe that a “golden age” had gilded some remote past ; that a terrestrial Paradise had been conferred by the Almighty on a pair of human beings “created in his own image,” and made “very good ;” and that from this perfect pair descended the murderous Cain and an innumerable multitude of degenerate children. Taught to believe that we are members of a retrograding race, it is no wonder that men should readily credit any evidence tending to prove that

the race is growing worse. But the evolutionist, denying man's origin from a perfect pair, and assigning this origin to a much more lowly source, enjoys a firm and cheerful faith in man's progress, and, therefore, demands indisputable proof of any claims made in behalf of the "good old times," and indisputable proofs of any accusations that the mass of mankind has retrograded. This healthy skepticism of evolution has prompted in recent years many notable and instructive researches. To one of these your special attention will be called.

The Rev. Dr. Valpy French published in 1884 an octavo of 398 pages, entitled "Nineteen Centuries of Drink in England," which furnishes most valuable evidence on the question whether the frequent and positive assertions that intemperance is increasing are justified by history. From this source chiefly, but also from other sources, I have gathered some historical notes, which require a brief preface before presentation. These notes are, of course, less and less numerous and satisfactory the farther back they go into past centuries, when literature and history were less and less cultivated. While the many dates attached to these notes indicate often the date of record, and always the special time referred to, yet it ought to be obvious to the reader that in this matter, whatever may have been true as to any particular year was probably equally true as to many other years, both preceding and succeeding the particular year referred to. From my brief notes many instructive references are plainly to be drawn, which a desire for brevity induces me to leave to the reader. Finally, it should be remembered that although my notes are comparatively few, they serve as good examples of numerous others to the same effect; and that although they refer more especially to England, yet that they fairly illustrate the United States, whose people were English until 1776, and of whom a vast majority continue to be of Anglo-Saxon descent.

My notes are as follows:—

The abuse of alcoholics, and even their desecration to religious debauchery, prior to the Christian era, has been already referred to, and is familiar to every student of history. The Bible records one instance from which I derive some consolation, and shall note before entering upon the record of intemperance since the birth of Christ. Benhadad, king of Syria, in company with thirty-two other kings, all got drunk together. Now, not even newspaper reporters will allege that modern kings so badly misbehave themselves.

*First Century.* Pliny the Elder (who died A. D. 79) wrote,—“The whole world is addicted to drunkenness. The perverted ingenuity of man has given even to water the power of intoxicating, where wine is not procurable. Western nations intoxicate themselves by means of moistened grain.” Tacitus testifies that in the first century the Germans were greatly addicted to drinking beer to excess. In order “to check the growth of intemperance,” the Roman Emperor Domitian issued, A. D. 81, an edict which prohibited vineyards in England. This edict was revoked A. D. 276. From A. D. 45 to 410 the Romans ruled

Britain. They introduced drinking bouts and the custom of drinking healths; and they sowed the seed of Roman debauchery, which yielded a rank crop of excesses, not only in drinking, but also in other vices.

*Third Century.* Intemperance was no stranger to any rank of society. A. D. 281 a Roman emperor, defeated in battle, committed suicide by hanging, and the people said of him, "There hangs a tankard and not a man."

*Fifth Century.* In A. D. 449 Britain became England by the conquest of the Angles and the Saxons, and drunkenness was a prominent link in the chain by which this conquest was effected. The Saxons carried the German custom of drinking beer to excess to vanquished England, and history declares that the English inherit from their Saxon forefathers "a perfect legacy of corruption." History further records that subsequently, in the middle ages, "strong wine or ale was drunk early in the morning and often far into the night; in short, gluttony and intemperance were prominent characteristics of the sturdy, fighting Britons of mediæval times." As is well known, the Anglo-Saxon successors of these Britons have been the greatest of all colonizers, and have circled the earth not only with the sound of their drums, but also with their ales and worse liquors.

*Sixth Century.* Christianity was introduced into England during this century. About 575, Gildas, a distinguished British ecclesiastic, declared that "not only the laity, but also our Lord's own flock and its shepherds, who ought to have been an example to the people, slumbered away their time in drunkenness, as if they had been dipped in wine." The British Church issued decrees respecting intemperance, so great was the evil. The action of the authorities of the church, in respect to intemperance, has special significance, not only because of the indications of gross and frequent intemperance among the highest teachers of morality, but also because of the great power wielded for many centuries by ecclesiastical laws and courts.

*Seventh Century.* The dedication of churches to God was attended, about 669, by "disgraceful scenes of riotous festivity." About 690 an archbishop harshly censured his bishops because given over to "drunkenness and other snares of a sensual life." During this century there is on record an almost continuous series of ecclesiastical canons, decrees, and anathemas bearing upon the national intemperance.

*Eighth Century.* In 747, ecclesiastics and monastics were admonished for "drunkenness," and nunneries were warned that they must cease to be secret *rendezvous* for drunkenness and other sensual vices. Saint Boniface, a native of England, wrote that drunkenness was "an evil peculiar to pagans and to *our* race."

*Tenth Century.* About 970, King Edgar, being prompted thereto by Archbishop or Saint Dunstan, harangued his clergy thus: "They spend their days in diversions, entertainments, drunkenness, and debauchery. Their houses may be said to be so many sinks of lewdness. There they pass their nights in rioting and drunkenness." At the close



of this century, the first toast at royal festivals was to the king; the second to Christ; the third to the archangel Michael; then to St. John the Baptist, etc.

*Eleventh Century.* In 1008 priests were publicly warned not to visit ale-houses nor to get drunk. Niebuhr says that "England at the time of the Conquest [Norman, in 1066] was not only effete with the drunkenness of crime, but also with the crime of drunkenness."

*Twelfth Century.* John of Salisbury wrote,—“Habits of drinking have made the English famous among all foreign nations.” There is abundant evidence that the clergy continued to be drunkards.

*Thirteenth Century.* The archbishop warned clergymen against “the ill practice by which all that drink together are obliged to equal draughts, and he carries away the credit who hath made most drunk and taken off the largest cups: therefore we forbid all forcing to drink.” In 1275 popular drinks were called “bishop,” “cardinal,” “pope,” instead of “punch,” “smash,” and “cocktail,” as now.

*Fourteenth Century.* In 1308 a bishop’s induction to his see was often a disgrace to civilization because of the drunkenness and rioting. In 1363, as also in 1468, the heads of the church had to forbid drinking *inside* of the churches. In 1399 Froissart says that at a king’s pageant in London, seven street fountains were made to flow continuously with wine to supply the people; and that the common allowance of alcoholics for a gentleman with his lady, at breakfast, was one quart of beer and one quart of wine.

*Fifteenth Century.* In 1464 the amount of strong drinks taken at public entertainments was prodigious. In 1483, funerals as well as weddings were scenes of drunkenness.

It now deserves note that it was in this century that William Caxton introduced the art of printing into England, printing, in 1474, the first English book ever published. The wonderful progress of this art is well known, and accounts for the fact that historical records have become more and more abundant from that time to the present day.

*Sixteenth Century.* In 1504 the clergy, high and low, were given to drunkenness. In 1536 it is stated that great irregularities and licentiousness had crept into religious festivals, especially in the churches, chapels, and graveyards. “Public houses were crowded in London from morning to night with inveterate drunkards.” In this place it deserves note that in 1534 England, under Henry VIII, denied the pope and the Roman Catholic Church. Until 1551 England had had no civil legislation whatever against drunkenness; but in this year it was made a crime. How universal and respectable was the custom of drinking to excess is proved by the fact that the first good drinking song in the English language was written and published by the Rt. Rev. Dr. Still, a bishop of the English Church. The first stanza and chorus of this famous song are as follows:—

“I cannot eate but lytle meate,  
My stomacke is not good,

But sure I thinke that I can drinke  
 With him that wears a hood.  
 Though I go bare, take ye no care,  
 I nothing am a colde,  
 I stuff my skyn so full within  
 Of jolly good ale and olde.

*Chorus:* "Backe and syde go bare, go bare,  
 Booth foote and hand go colde,  
 But belly, God send thee good ale ynoughe,  
 Whether it be new or olde."

Considering the evidence given in all the four stanzas, the modern hygienist is not surprised that the pious bishop's stomach was "not good." About 1576 Bacon wrote that "all the crimes on the earth do not destroy so many of the human race, nor alienate so much property, as drunkenness." Acts of parliament in 1597 and in 1602 testify to an increase of drunkenness.

*Seventeenth Century.* Early in this century, in Shakespeare's time, public houses served ale to each customer in vessels which often held as much as eight pints. Some physicians prescribed drunkenness as a remedy for disease. In 1609, kings got drunk, and ladies of rank "rolled intoxicated in open court at the king's feet." Legislative restriction and ecclesiastical monition were rife against drunkenness. From 1603 to 1607, laws had been enacted to restrict the number of drinking-places by licensing inns and ale-houses, and to punish drunkenness by fine and confinement in the stocks; but a statute of 1609 declares that "notwithstanding all former laws and provisions already made, the inordinate and extreme vice of excessive drinking and drunkenness doth more and more abound," and like evidence is given by a statute of 1623. Under the laws made to discourage drunkenness, justices were openly charged with being more industrious in patronizing, than diligent in suppressing, drunkenness and drinking-houses. It is recorded that the misgoverned homes of gentlemen, ministers, magistrates, and great men were often made "the very theatres of Bacchus." Bishop Hall declared that drinking was "the most popular vice;" and in 1621, Burton, the author of the *Anatomy of Melancholy*, exclaimed,—“What immoderate drinking in every place!” “’T is now,” said he, “come to that pass that he is no gentleman, a very milksop, that will not drink.” The poet Milton also testified, about the middle of this century, that there was “no more foul common sin among us than drunkenness.” In 1627, wakes were prohibited because of the drunkenness attending them, and in 1632 it is declared that there was a profusion of drinking-houses in London, and that, in some localities, whole streets were lined continuously with such houses. In 1643 the duty on alcoholics known as the “excise” was first established.

In Cromwell's time, 1650-1658, England had earned for herself the distinction of being “the land of drunkards.” Ladies of the highest quality visited taverns to drink, and at table women vied with the men in drinking. Drinking was the afternoon's diversion of the gentry, and

it was deemed "a piece of wit to make a man drunk." Cromwell strove in vain to repress intemperance by fines and punishments. An author of that day wrote as to London, "For confident I am that fifteen of twenty, this city over, are drunkards."

During the reign of Charles II, 1660-1685, history records that "drunkenness prevailed in every rank of society, and the king set the example." It is said, in 1672, that "no kind of business is transacted in England without the intervention of pots of beer," and in 1682, that the vice of drunkenness even "beset women of rank."

During the reign of William and Mary, 1689-1702, "from highest to lowest, intemperance raged;" there were "thousands of beggars, both men and women, perpetually drunk." In 1689 the importation of all foreign spirits was prohibited, but the home distilleries flourished all the more. In 1693 a common but a heavy charge on the church parishes was for "communion wine" and "wine for the vestry." A bishop of the English Church did not hesitate publicly to admonish his people that "it was wrong to get drunk on the day of the funeral of a bishop," but when a king or ruler died it was "not a sin to get drunk." In 1695, at Warwick castle, a cistern containing 120 gallons of punch was emptied to the health of His Majesty William III.

*Eighteenth Century.* The British "parliament attempted at the beginning of this century to check the excessive use of ardent spirits by imposing an enormous duty," but, through smuggling, "the act became a dead letter, and was repealed in 1742." In 1713 there was "unbridled excess in drinking." The Bishop of Cork delivered a discourse to his clergy against drinking in memory of the dead. In 1716 "the abuse of the practice of toasting had become a national disgrace." In 1720, weddings and funerals were incomplete without wine, and many women at such times drank freely.<sup>1</sup> In 1724 gin-drinking raged as an epidemic; and "retailers of gin hung out painted boards announcing that their customers could be made drunk for a penny, dead drunk for two pence, and have straw for nothing," and cellars were provided with straw for those who became drunk to sleep on until they became sober.

In 1725 drinking among women was common. In some cases, every seventh house in London sold intoxicants, and Benjamin Franklin found printers drinking habitually five pints of porter daily. In 1732 a prohibitory duty was placed on the retail of spirits, but, nevertheless, intemperance spread like a plague, and in 1736 a much more stringent prohibitory law, the famous "Gin Act," was enacted, but "it was ineffectual even to check the progress of intemperance," and, though powerless for good, was charged with increasing the evil.

In the House of Lords, in 1743, Lord Hervey denounced the "universal thirst" for alcoholics. Lord Lonsdale said that whoever passed along the streets saw drunkards "stretched along the pavement," and others

<sup>1</sup> A learned and pious friend asserts that history proves that the custom of holding the marriage ceremony in England in the earlier part of the day was due to the frequent inability to procure, at later hours, a sober clergyman to perform the ceremony.



not there, but much more dangerous. "No man can pass," said he, "a single hour in public places without meeting such objects, or hearing such expressions, as disgrace human nature." "Not only are our streets filled with madmen and our prisons with criminals, but also our hospitals with cripples." He also referred to "women who riot in this poisonous debauchery." About this time the so-called "Tippling Act" was passed, which prohibited the retail of spirits. The results were that appetite was diverted into the channel of beer; that within two years, 12,000 persons were punished for violation of the act; that spirits were clandestinely sold; that the law could not be executed; and that it was forcibly proved that "a government cannot be far in advance of the people whom it governs. Extreme repression has been and ever will be evaded."

In 1748 there was much denunciation of intemperance among women. In 1773 Dr. Samuel Johnson said,—"I remember when *all* the decent people in Lichfield got drunk *every* night, and were not the worse thought of," and that there was then, in 1773, less drinking than with our ancestors. In 1787 the historian of the Life of George IV wrote that "men of all ages drink abominably." Taverns were crowded with morning drinkers, colleges were beset with drunkenness, and drunkards of repute scandalized public worship *inside* the churches. It was from 1733 to 1762 that Hogarth gained his fame by depicting the vices of his time in such famous and life-like sketches as "The Harlot's Progress," "Gin Lane," etc. Throughout the eighteenth century habitual drunkenness was prevalent, not only among the highest in the land, but also among collegians, tradesmen, and every grade of society. An historian truthfully says that "drunkenness, dissoluteness, and the sword, hanging on every fool's thigh to do his bidding, were the characteristics of the period. People got drunk at dinners, and then slew one another, or in some other way broke the law." Thackeray's "Henry Esmond," which Anthony Trollope lauded as the best novel in the English language, portrays these characteristics of the eighteenth century vividly, and no doubt faithfully.

*Nineteenth Century.* In 1805 William Playfair wrote,—"Drinking and gluttony are the vices to which the common people in this country are most addicted." In 1814 "drinking was the fashion of the day." "Drinking and play were more universally indulged in than at the present time." At dinners, each guest was given two bottles of port, and there were men well known as three, four, five, and even six bottle men. In 1824 "the stronger spirituous liquors were all the rage." Referring to Christmas in London, it is said that "in every broad thoroughfare and in every close alley there was drunkenness abroad; not shamefaced drunkenness, creeping in maudlin helplessness to its home by the side of the scolding wife, but rampant, insolent, outrageous drunkenness. No decent women, even in broad daylight, could, at the holiday seasons, dare to walk alone in the Strand or Pall Mall." In 1830, women frequented drinking-places in London, and at a police

station there were found "mostly women who had been picked up in the streets where they had fallen drunk." Officers of courts of law alluded to the increase of the consumption of gin "as a dreadful and horrible evil." Sir George Hampson said that "gin-shops were now decorated and fitted up with small private doors, through which women of the middle, and even above the middle, classes of society were not ashamed to enter and take their dram, when they found they could do so unobserved."

"Britain's plague-spot of drunkenness" was so great, and the "spirit-drinking so terrible," that parliament enacted the famous Beer Act of 1830. This act permitted the sale of beer and cider by retail in England, but imposed a heavy license tax on the vending of wine and spirits. The results teach a notable lesson to those who make the laws, and were as follows: During the ten years preceding the act, 1821-1830, the quantity of malt used for brewing was 268,139,389 bushels, and the quantity of British spirits consumed was 57,970,963 gallons; and during the ten succeeding years, 1831-1840, these figures were notably increased to 344,143,550 bushels of malt, and 76,797,365 gallons of spirits. In further confirmation of these figures, it was found that the Beer Act was followed by a large increase in the number not only of beer shops, but also of shops for the sale of spirits. In 1849 a select committee of the House of Lords reported that "it was already sufficiently notorious that drunkenness is the main cause of crime, disorder, and distress in England, and it appears that the multiplication of houses for the consumption of intoxicating liquors, which, under the Beer Act, has risen from 88,930 to 123,396, has been thus in itself an evil of the first magnitude." In 1854 a committee of the House of Commons reported that "the beer-shop system has proved a failure;" that "the amount of drunkenness is very much greater than appears upon the face of any official returns;" and that the testimony is universal to the greatest amount of drunkenness on Saturday night, and on Sundays during those hours when the drinking-shops are allowed to be open.

In 1860 the "Wine Licenses Act" was passed, which greatly encouraged and immensely increased the amount of light wines drunk. In 1869 the "Habitual Drunkard's Bill" became law. In 1880 the "Local Option Act" was passed, entrusting every community with power to protect itself from traffic in liquor. The results of this act are reported to be excellent, and, as one instance thereof, it is said that there were, in 1884, more than 1,000 parishes in the province of Canterbury where there was neither a public house nor a beer shop, and "where, in consequence of the absence of these inducements to crime and pauperism, the intelligence, morality, and comfort of the people are such as the friends of temperance would have anticipated." An additional proof of the good results of "local option" in England is found in a statistical, not temperance, report that a comparison of the drink bills of 1876 and 1884 shows that the \$735,000,000 spent in 1876 was reduced in 1884 by more than \$23,000,000.

The evidence now presented fully justifies Herbert Spencer in the following statements: "In generations not long passed away, sobriety was the exception rather than the rule: a man who never had been drunk was a rarity. Condiments were used to create thirst; glasses were so shaped that they would not stand, but must be held till emptied; and a man's worth was in part measured by the number of bottles he could take in." This last statement of Spencer's is verified by one of Burn's drinking songs:

"Wha first shall rise to gang awa',  
A cuckold, coward loon is he!  
Wha last beside his chair shall fa',  
He is the king amang us three!"

Spencer further says that "for a long time past among the upper classes the drinking, which was once creditable, has been thought a disgrace; while among the lower classes it has greatly decreased, and come to be generally reprobated."

For my own part I am sure that drunkenness has decreased where all reforms begin, at the top, that is, in so-called good society. Within my own manhood, say since 1850, it has certainly become far less common for gentlemen to make of every sideboard a private bar, and insist for hospitality's sake that every visitor shall "take a social glass;" to accept "treats" and get "tight," whether desired or not; to deem it an insult if a "treat" be declined; to drink each other literally "under the table;" and to boast of the number of bottles required to convert a gentleman into a brute. Drunkards have certainly become less numerous in the homes of good society and are less respected by the public. Such is my testimony to what has occurred during my own manhood, and to this I will add much more conclusive evidence.

The Hon. Joseph Nimmo, Jr., chief, in 1883, of the U. S. Bureau of Statistics, favored me with a table of the annual consumption of alcoholics at each decemniad from 1840 to 1880 inclusive. This table proves that in proportion to population, and comparing 1850 with 1880, the quantity of alcoholics consumed in the United States had very greatly increased. But it also proves that the quantity of alcohol consumed, the sole question of moment, had decreased. This apparent contradiction is easily explained by the facts that the quantity of spirits consumed in 1880 had so much decreased, that the enormous increase in the consumption of malt liquors especially and of wine failed to make the quantity of alcohol consumed in 1880 equal to what it was in 1850.

This conclusion is derived from the following data: The population was 23,191,876 in 1850, and 50,155,783 in 1880; the alcoholics consumed in 1850 were 51,833,473 gallons spirits, 6,315,871 gallons wines, and 36,563,009 gallons malt liquors, which amount to a total of 94,712,353 gallons; and in 1880 63,525,694 gallons spirits, 28,329,541 gallons wines, and 414,220,165 gallons malt liquors, which amount to a total of 506,076,400 gallons. Now, sanitarians usually estimate that



spirits average about 50, wines about 10, and malt liquors<sup>1</sup> about 5 per cent. of alcohol, and this estimate yields the results that in 1850, while there were 4 gallons of alcoholics per head, this contained 156 ounces of alcohol; and that in 1880, while there were 10 gallons of alcoholics per head, this contained only 141 ounces of alcohol,—a decrease of about 10 per cent.

Even if there had been an increased consumption of alcohol, this would not have necessarily proved increased abuse of alcoholics. Their greater cheapness and the greater facilities for their transportation and distribution would naturally cause greater waste, greater use for other purposes than drinking, and their more universal and habitual use for drinking in moderation. Thus, there might be less abuse, yet greater consumption. Beyond doubt, the comfort of the people, their health and longevity, have all greatly improved in recent times, and such improvements are inconsistent with the belief that alcoholic abuse has increased.

In view of all the facts now presented, it seems to me impossible to refuse assent to the conclusions of the Rev. Dr. French, which are that it is “an unquestionable fact that in the higher circles of society, far less is drunk than formerly;” that it is beyond question that “temperance habits have made prodigious strides in the last few years;” that “temperance and total abstinence march from one conquest to another, blessed by bishops, clergy, and even princes of the Christian church, patronized by doctors, eulogized by hard-headed men of business, and gathering in everywhere crowds of enthusiastic converts.” In truth, now for the first time in the history of Christian nations, gentlemen regard drunkenness as vulgar, the clergy of all creeds denounce it, our laws stamp it with opprobrium, the enemies of intemperance are organized in armies of hundreds of thousands,<sup>2</sup> and public education is fostering among children a knowledge of the evils due to alcoholics. I think all must now concede that there are some very gratifying compensations and consolations for the monstrous evils caused by the abuse of alcoholics.

#### CAUSES AND REMEDIES.

The effectual application of remedies to any evil depends upon due appreciation of its causes; and the worse the evil the more important is it, if we would apply the best remedies, that the causes should be duly appreciated. As has been stated, the abuse of alcoholics originates in the beneficent instinct which prompts man to seek pleasure and to avoid pain. Alcoholics will be used as long as they continue to be the best agents known to man to heighten his joys and to make him forget his woes, if only momentarily; and they will be abused until men have become so convinced, that alcoholics cause, in the end, far more pain than

<sup>1</sup> Dr. Englehardt's able report to the New York Board of Health states that in American lager beers the percentage of alcohol ranges from 1.45 to 4.14, with a general average of only 2.78. Another report gives the general average as high only as 4.28. I have found no reports as to American wines.

<sup>2</sup> The first temperance union organized in the United States was at Boston, in 1826.

pleasure, that this conviction will develop strength of will sufficient to enable men to sacrifice slight present gratification to great future good.

History proves that these causes promotive of temperance have progressed; for surely history proves that the pleasures of life have increased, and its pains have diminished, thus greatly lessening the temptations to drink; that there is a more wide-spread and firmer conviction of the evils due to alcoholics; and that in the struggle for existence men have gained, in larger and larger number, strength of will to sacrifice present gratification to future good. Thus history teaches, first, that temperance has increased, and, second, that the causes thereof have also increased; and the fact that these two lessons are taught independently, and yet that the one confirms the other, is calculated to strengthen one's faith in both lessons, and to confirm the conviction that if we would speed the temperance cause we must foster those conditions by which this cause has already been so signally promoted. We must strive to increase the pleasures and to diminish the pains of life, and to lessen in every way the temptations to drink; and we must labor, above all things, to disseminate a knowledge of the monstrous evils of intemperance. To accomplish these ends there are three remedies,—*Sanitation, Prohibitory Laws*, and *Public Education*,—which will be briefly considered.

*Sanitation.* Probably nothing tempts men to drink more frequently than low spirits, and sensations of languor, debility, and exhaustion. These are most often due to lowered health and vitality; for the number of the healthy who do not maintain the maximum of health is very great. Lowered health and vitality are caused chiefly by sanitary evils, such as impure air and water, insufficient and badly cooked food or other errors of diet, overwork and also underwork of body and mind, and by the ignorance, improvidence, poverty, and want which foster these evils. Considering these things, a wise man, though not a physician, has declared that what is chiefly needed to stop the abuse of alcoholics is the sanitary reformer. To furnish one illustration, it has been found that intemperance in England prevails most in the marshy localities infested by malaria; and I have long held that if there be, as I fear, more intemperance in Louisiana<sup>1</sup> than in many other states, this is due chiefly to the greater prevalence of swamp poison.

While many men are tempted to drink by the depressing influence of sanitary evils, a large number are also often tempted to drink by the desire to escape temporarily from the toils of a dull, stupid, and monotonous life, and "to have a little fun." As respects this last temptation, I believe that churches are responsible for the extra large amount of drunkenness which so often disgraces Sunday, by having made this day the idlest and most stupid in the week; and I rejoice that I can here summon

<sup>1</sup> The "Finance Report" (p. 100) of the U. S. Secretary of the Treasury for 1880 shows that the proportion of liquor dealers to the total population was 1:306; that the variations from this general average were 1:64 in Nevada and 1:857 in Maine; that the proportion in Louisiana was 1:237, ten states having had a greater and twenty-seven states a less proportion of liquor dealers. However, this evidence is not conclusive as to the relative amount of alcoholics consumed.

to my aid the high authority of the Rev. Charles Kingsley, whom I honor as the highest authority on this subject, because while he equalled other preachers in knowledge of the laws to save man's soul, he surpassed them in knowledge of God's laws to save man's body. He urged,—“Let us see, in the name of Him who said that He had made the Sabbath for man, and not man for the Sabbath,—let us see, I say, if we cannot do something to prevent the townsman's Sabbath being not a day of rest, but a day of mere idleness, the day of most temptation, because of most dulness of the whole seven;” and he taught that a much needed reform was the provision for the people of more numerous and refined places of recreation on Sundays, as well as on all other days.

For such reasons sanitarians strenuously urge, as most important remedies for intemperance, first, the removal of all sanitary evils, and, second, the provision of public parks and gardens, of libraries, museums, art galleries, music halls, baths, gymnasia, good, cheap restaurants, and all other means to nourish, strengthen, and recreate body and mind. But the adoption of such measures depends upon their appreciation by the public, and on their recognition not simply as desirable, but as indispensable to the general welfare. No such practical appreciation can be secured except by disseminating amongst the public a knowledge of the laws of health as respects all sanitary evils as well as intemperance. Thus sanitation, as a remedy for the abuse of alcoholics, depends on public education.

*Prohibitory Laws.* Herbert Spencer teaches, as to the efficiency of laws, that “the belief that a faulty character can so organize itself socially as to get out of itself conduct which is not proportionately faulty, is an utterly baseless belief.” History teaches the invariable lesson that laws not sustained by the moral convictions of the people, above all, those laws which require for their execution not a few officers, but the bulk of the community, cannot be enforced. A wise judge writes, that “for the enforcement of the law, we need not only persons ready to set prosecutions on foot and officers ready to serve warrants of arrest, but we need also courts and juries ready to convict on sufficient evidence, and witnesses willing to testify. For all these we must have an overwhelming public sentiment in favor of the law.” A law can do no good unless executed, and, manifestly, it will always be evaded as long as the public or those on whom its execution depends have both the *desire and power* to evade it.

Hence, prohibition, first tried in the Garden of Eden, failed there; it has failed when applied especially to alcoholics very many times since; and it must always fail of complete success, except in cases where the people would voluntarily refrain from what the law prohibits. It is notorious that neither the Maine liquor law of 1851, nor many subsequent state laws, nor any other prohibitory laws, have ever, in fact, succeeded in wholly prohibiting. However, I am inclined by personal observation to admit that while such laws have not abolished, they have tended to diminish intemperance, and to do good in two ways,—first, by increasing



the obstacles and thereby diminishing the temptations to drink; and, second, by arousing discussion, which is the great disseminator of knowledge. Dissemination of a knowledge of the evils of intemperance is the best means to foster, among those who alone have the power, the desire to enforce the law.

But even if it be conceded that these and other benefits have been conferred by prohibitory laws, there still remains the question whether there have not resulted evils which more than counterbalanced the benefits. Many wise men, lovers of temperance, urge that a great evil, the disrespect for all laws, is fostered by the repeated failures to enforce prohibitory laws; that such laws foster secret drinking and the abuse of opiates, chloral, etc.; that laws prohibiting the use of alcoholics are no more justifiable in principle than would be laws prohibiting the use of tobacco, tea, or other articles of which the abuse is injurious; and that these laws are unjust, because they punish especially liquor-sellers, while liquor-buyers, without whom there would be no liquor-sellers, go, for the most part, unpunished. The Hon. T. F. Bayard, our present Secretary of State, a pure and temperate man, and certainly one of our ablest statesmen, declares that even "local option" laws are of "very doubtful constitutionality, and positively inexpedient." The wise and temperate Bishop Magee, of England, maintains that he would rather see England free than England sober; and John Stuart Mills, for like reasons, denounced all prohibitory laws. However anxious to promote the cause of temperance, the American who rightly values his freedom is forced to question, in view of such opinions from such sources, whether prohibitory laws may not give rise to more evil than good; and his doubts are not relieved in favor of such laws when he compares temperate with intemperate nations,—say, temperate but despotic Turkey with intemperate but free England. Further, it has been forcibly urged that what mankind needs chiefly to cultivate is a virtue which can march untempted and unharmed through rows of rum-shops. The evolutionist maintains that man is a progressive animal, and, therefore, that such a virtue can be developed. Whether prohibitory laws are calculated to nourish such a growth seems doubtful.

Notwithstanding all these doubts, I find it impossible to withhold my sympathy from any laws which tend to abate the monstrous evils of intemperance, and which effect *apparently* more good than harm. I fully concur with a recent legal authority, possessed of a large judicial experience in this matter, who maintains that wise laws should attack the profits of liquor-sellers by taxing these profits to such extent as may be needful to refund the large annual expenditure out of the public treasury because of drunkenness,—such expenses as the public now incurs to prosecute drunkards, and to support them, as also those made paupers by them. And I rejoice exceedingly when I read the report that the "high license" law of Illinois did, in 1885, increase the annual revenue of the state from \$700,000 to \$4,500,000, and decrease the drinking-saloons from 13,000 to 9,000.

Further, in spite of the warnings of Mr. Bayard, and of other statesmen and philosophers, my sympathy is strongly in favor of "local option," the law which gives to a majority of any community the right to determine whether alcoholics shall be *sold* within its limits. The evidence from both England and this country seems to be conclusive, as common-sense would expect, that prohibitory regulations, adopted by a majority of a community, have been far more successfully executed than general state laws, whose purpose it is to control communities opposed to as well as those in favor of prohibition. The evidence seems conclusive also that "local option" has greatly lessened intemperance with all its evils, and contributed signally to the public welfare. From no source is this evidence more decisive and gratifying than from the South. South Carolina, Georgia, Alabama, Arkansas, Mississippi, Texas, and Louisiana are now actively engaged in the praiseworthy and apparently successful *experiment* of fighting intemperance with the "local option" law. The most notable success is claimed for Georgia, where it is reported that there are now (1886) 115 "*dry*" counties, and only 19 "*wet*" ones remaining. Although Louisiana lags behind in this race, yet in the past two years 14 of its 58 parishes are reported to have adopted the "local option" law to the manifest benefit of their inhabitants.<sup>1</sup>

But, after all, what is the cause of the present uprising of the people in favor of "local option" and other prohibitory laws? Such laws are not recent inventions. Ever since 1855, Louisiana has had recorded on its statutes<sup>2</sup> a law fully authorizing "local option," and yet this law remained inoperative until 1884, when it was reënacted,<sup>2</sup> without, however, adding to it anything essential.

In these facts I find conclusive proof that in consequence of a better and more wide-spread knowledge of the evils of intemperance, the moral conviction of the people has undergone a change, and that the recent triumphs of "local option" are due to the progress of the people in intelligence. The "local option" law of Louisiana had to await for thirty years the development of public sentiment. Until this development took place, the people ignored the law completely. Hence it follows that it is indispensable, if we would promote temperance by legislation, to develop public sentiment in favor of temperance.

While legislation on such subjects as the abuse of alcoholics cannot outstrip popular intelligence, yet legislation has no end more important than to promote this intelligence, which reacting on legislation will promote it in return. Thus alone can progress be secured through legislative instrumentality. On this subject one of England's greatest statesmen said that "sanitary education must precede sanitary legislation;" and three of the world's wisest men,—Milton, Bentham, and Mills,—concurred in teaching that "all the legislator can hope to accomplish is to

<sup>1</sup> Great reduction in the number of "assault and battery" and "murder" cases, with more stringent enforcement of law, is especially reported.

<sup>2</sup> See Secs. 1211 and 2778, Rev'd Stats. of La. 1870, and Act No. 76, pp. 98 and 99, Acts of La. 1884.

increase the efficacy of private ethics." Now the best way by which legislators can promote the efficacy of private ethics, in regard to intemperance as well as other sanitary evils, is by promoting education and diffusing information on these subjects; for the great lesson of hygiene is, that health is essential to the discharge of the duties of life, and therefore that "it is *immoral* so to treat the body as in anywise to diminish the fulness or vigor of its vitality."

*Public Education.* It has now been shown that of the three remedies for intemperance, two of these, sanitary reform and prohibitory laws, depend on the third,—public education. This, therefore, is the remedy which deserves the most confidence, and fortunately all lovers of temperance can unite in its behalf, however divergent their views as to prohibitory laws. There are many of the most influential advocates of temperance who have little faith in laws to make and keep a people virtuous, but who have great faith in disseminating a knowledge of the evils of intemperance, in persuading and convincing the ignorant, and in inculcating by example and precept good habits in early life.

These temperance men, though not members of any temperance party, contend with good reason that the cause of temperance was progressing prior to the enactment of any prohibitory laws in this century; that the cause is still advancing in communities and states which continue without such laws;<sup>1</sup> that this progress was and is due chiefly to the progress of knowledge, to persuasion rather than to force; and that, though such progress be too slow and gradual for hopeful, tender-hearted philanthropists, yet that it is the surest and safest.

For my part, I fully concur with a committee of the British parliament, which, as long ago as 1834, urged, as I believe, for the first time, that in order to abate the monstrous evils of intemperance a national system of education should furnish every child "accurate information as to the poisonous and invariably deleterious nature of ardent spirits as an article of diet in any form or shape." But as important as is this lesson, hygiene inculcates so many other invaluable lessons that it constitutes one of the practically most useful of all studies. However much the ignorance, prejudice, and customs of the past have ignored it, it remains true that no instruction can be more important than that which teaches the young how to preserve the health, on which the usefulness and happiness of life depends, and therefore that this instruction should be compulsory in our public schools. Hence I have strenuously advocated the study of hygiene in all schools, and I have heartily united with many good citizens and enlightened organizations in earnestly petitioning our legislature to enact a law which would render the teaching of this knowledge, which is indispensable to the public health and the common welfare, compulsory in the public schools. If present studies overtax the pupils, as is so often objected, then let the study of the more useful laws of

<sup>1</sup> Twelve such states were reported in 1885, *viz.*, California, Colorado, Florida, Kentucky, Maryland, Missouri, Nevada, New Jersey, Ohio, Oregon, Tennessee, and Virginia.



health be substituted in part for less useful studies. Although Louisiana continues without, yet in 1885 fourteen states<sup>1</sup> had such a law, and this was due in large part to the wise and active efforts of the Woman's Christian Temperance Union. Fortunately for New Orleans, its board of school directors took, in 1884, such efficient action in this matter, that now nothing is required for complete and permanent success except adequate appropriations to the school funds.

<sup>1</sup> Alabama, Indiana, Kansas, Maine, Massachusetts, Michigan, Missouri, Nebraska, Nevada, New Hampshire, New York, Oregon, Rhode Island, and Vermont.

## IX.

### THE RELATIONS BETWEEN SANITARY SCIENCE AND THE MEDICAL PROFESSION.

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#### SANITARY SCIENCE.

What is sanitary science? This phrase is comparatively new, but is full of meaning. The word "sanitary," in its derivation and uses, signifies health or healthy, but when combined with science, is far more expressive. It means the application of laws or principles for the preservation of health in whatever way they may be employed. As to the use of the term science here, the claim cannot justly be called in question. To such an extent have these principles been discovered and applied, and so uniformly and certainly have the same results followed, that they may be said to constitute a science—*the science of health*.

It is not necessary that these laws should be understood by everybody, and admitted as true, that they be considered a science; but if they have been extensively applied by a large number of good judges, and the same results never fail, they constitute, when combined, to all intents and purposes, a *science*,—as much so as physiology or biology. Both these are comparatively modern sciences: so is that of sanitation, certainly in name and application.

It is only about forty years since this subject began to attract general attention. It started with the establishment of the registration of births, deaths, and marriages in Great Britain, by Dr. William Farr. While investigating upon a large scale the causes of death, the inquiry naturally arose, What can be done to prevent as well as to cure disease? This inquiry, from a small beginning, has resulted in the most surprising advance in a knowledge of the laws of health and life. So rapid and extensive have been these changes, that one living during this period can hardly credit them; and never were these improvements taking place faster than at the present day. But the advantages already secured, though great and invaluable, are mere harbingers of richer and more permanent blessings in store. In the progress of this science, every year has signalized the fact that it had a deeper and broader scope; that its aim is not merely to remove the existing causes of diseases, but to destroy the germs or seeds of disease. It has also, we believe, a still higher and more important aim,—that is, to improve and perfect human organiza-

tion. It does not stop with preventing this or that contagious disease, or reduce to the minimum the zymotic class of diseases ; but when the principles of this science are applied to the fullest extent, they will present the human body so sound and healthy in all its parts as in a great measure to forestall disease.

There is, we believe, a normal standard of physiology, where all the organs are so sound and well balanced, and where all perform respectively their functions so thoroughly, as to afford small chances for disease. This organization represents the highest standard of health ; and the nearer the human body in all its parts approximates to this standard, the better or higher degree of health will every such person possess. With this view of physiology, it will be seen that all disease is a violation of law, whether it arises from internal or external causes. As there must be some change in the structure or functions of certain organs in the body for the introduction of disease, is it not clearly the province of sanitary science to take cognizance of such changes ? If the violations of law can be arrested or modified in the very first stages, may it not serve to prevent a vast amount of disease ?

There is a sphere higher and broader, where the principles of this science should be brought to bear,—that is, in perfecting the human body. It is well known that there is naturally a most surprising difference between one individual or one family, and another, as to good health and the liabilities to disease. Why should not sanitary science recognize this difference more, and point out the way whereby great improvements can be made in the physical system, and then eradicate, upon a large scale, the first, the primary, causes of disease ? By commencing early, and with the use of proper means, the organization of every individual can be greatly improved and made more healthy ; and by a proper application of the laws of inheritance for three or four generations, human organization may become so perfected as to diminish a large proportion of the sickness and disease that exist at the present day. This is not mere theory nor speculation, but a doctrine based upon the laws of physiology—laws which should be better understood. Inasmuch as such a change would be productive of sanitation in the highest degree, is it not the province of sanitary science to enter and cultivate this field ? Would it not improve health and prolong life upon the largest scale and to the greatest number ? What other science or agency can do this work so well ? That human organization can be improved by the laws of exercise, nutrition, and inheritance there can be no question. If the highest state of health depends on a normal standard of physiology, in which all parts of the body are perfect in structure, combined with a harmonious development of every organ, it is certainly the province of sanitary science to use all its appliances to obtain that standard. It is no more nor less than the same form or image in which man was created ; and the same Almighty power has established laws by the use of which man, in the process of time, can attain to that of his original creation. The more thoroughly physiology is studied with reference to sanitation,



the stronger is the evidence that man is the artificer of his own physical well-being. The laws of inheritance must become the agents of sanitary science; and healthy offspring must become an object of primary importance. When the principles of physiology and sanitary science are both brought to bear in renovating human organization, we shall find that a wise provision is made for the redemption of the body as well as the soul. We cannot expect this change will be brought about by divine interference, nor is it left for accident or chance, but the means and responsibility are wisely placed in the hands and power of human agency.

In case the body is thus reconstructed,—made sound and healthy in every part,—the germs or seeds of disease will not be found in the system. Here is work for sanitary science on the largest possible scale. In making these changes, in order to secure the highest standard of health and to the greatest number, it will be seen that sanitary science has a great work to do. The whole system of education, especially in early life, must be based more and more upon the systematic training and development of the body. There are a multitude of evils in the present state of society that conflict with the laws of health and life, which sanitary science would tend to remove or regulate. Then, in all matters pertaining to mental improvement, to the progress of society, to every phase in civilization and the various developments of Christianity, the sanitation of the body and of the mind should be paramount to everything else. In fact, the province of sanitary science covers the entire life, not only of every individual, but of the whole human family. No other subject or science is of such transcendent importance. It is in its infancy, and no comparison can be made between what it now is and the magnificent proportions it is destined to attain.

Taking this view of physiology, and that health is its normal condition, it will be seen that all deviations from this state, or violations of the laws that govern it, furnish the causes or entrance of weaknesses, imperfections, and diseases which afflict the human system. These changes may occur from internal, predisposing causes, or from agents operating externally to the body. Just at this point, in these changes of organization from a normal to an abnormal state, we are taught most important lessons. On one side, we have sanitation and sanitary science; on the other, disease, and its superstructure, medicine. Just here start the most powerful and destructive evils that ever befell the human family. These evils may be trifling in their origin, but increase—sometimes slowly, sometimes rapidly—and become terrible in their results. They include the whole catalogue of diseases; their name is legion. We dwell on this point, for it is very important to have clear and definite ideas of disease, its nature and cause. It is simply the penalty of violated law. There is no mystery in it; no visitation of Divine Providence; no curse inflicted by some evil spirit. It is no less important for sanitarians than for physicians to have a clear and definite knowledge of disease as well as its cause.

## HISTORY OF SANITARY SCIENCE AS CONNECTED WITH THE MEDICAL PROFESSION.

Formerly the great object of the medical profession was the *cure* of disease. The programme of studies and lectures in the medical schools was confined almost exclusively to this one idea. The term "hygiene" was scarcely to be found in books, or referred to in lectures. Physiology was comparatively a new science, and some of its most important applications have not been discovered, till within a few years. In fact, this science can not be fully understood in all its bearings without combining with it the principles of hygiene.

The study of physiology was formerly superficial, rather than profound. As the laws of health and life are based on this science, these of course were not very well understood. Hence there was great difficulty in ascertaining the real causes of disease, and the natural laws that governed it. *Health and its normal conditions* must be first understood, and disease—its causes and treatment—come afterward. Very little thought or attention was given to the object paramount to all others—health and its requirements. The whole burden of medical studies and lectures was pursued with special reference to disease and its treatment. Thus, in the preparation for the practice of medicine, the treatment of disease had so completely absorbed attention that normal physiology and the recuperating powers of nature have, in a measure, been overlooked. "*Vis medicatrix*" was a favorite phrase of some writers, but very little use has been made of its practical application.

Two great evils have grown out of this defective mode of education: 1st, a lack of clear and definite ideas of diseases and their causes; and 2d, a tendency, in the treatment of disease, to resort mainly to artificial means. But within thirty or forty years there has been decided improvement in respect to both these evils.

About 1840 several leading physicians in Great Britain, from careful observation and reflection, began to make some changes in their practice: 1st, to dispense less medicine; 2d, to study more carefully into the natural laws of disease; and 3d, to summon to their aid the powerful resources of nature. Among these physicians were John Forbes, John Connolly, Andrew Combe, and others. The *British and Foreign Medical Review* was their organ of publication, which attracted much attention. Several works explaining the views of these men were published at that time, and had a large circulation.

From 1840 to 1850 the registrar-general's office, for collecting and publishing reports of the births, marriages, and deaths in Great Britain, became fairly established. This agency has been more influential than any other for creating an interest in sanitary matters. An examination into the causes of death in different localities, and comparing the mortality of one place with another, started many inquiries on public health. The annual reports also from this office, prepared by Dr. William Farr, added greatly to the interest on this subject. About the same

period Dr. Andrew Combe, of Edinburgh, published several works on the application of physiology to education and health. These works had a very large circulation, and exerted great influence in directing public attention to the laws of health and life. The writings of Dr. A. Combe were peculiarly calculated to show the advantages of a practical knowledge of physiology for developing healthy bodies, and thereby preventing disease. While the writings of Dr. Combe were based strictly on scientific principles, they were remarkably well adapted, both in style and matter, to instruct the masses.

One of the most distinguished physicians at this time in Great Britain advocating reform in medical practice was Dr. John Forbes. In his celebrated paper called "Young Physic," which was published in the *British and Foreign Medical Review*, he made this significant statement: "Redoubled attention should be directed to hygiene, public and private, with a view of preventing diseases on a large scale, and individually in our sphere of practice. Here the surest and most glorious triumphs of medical practice are to be achieved." If this prophecy has not already been fulfilled, it is very evident that, in process of time, it will be, still more abundantly.

As a result of the interest on this subject, a royal commission was appointed, in 1857, to inquire into the sanitary condition of the army in England. This commission recommended that not only some regulations should be adopted for protecting the health of the army, but that a school be established for educating army surgeons, in which "hygiene and sanitary science" should be taught. This was the nucleus or starting-point of that celebrated work on practical hygiene by Dr. Edmund A. Parks. This "Manual of Practical Hygiene," constituting a treasury of knowledge on sanitation, has had a large circulation, and passed through several editions.

The interest in sanitary matters has been steadily increasing in Great Britain among all classes. Its fruits are becoming every year more and more manifest by improved health generally, and by a reduction of mortality, especially in cities. Numerous acts of parliament have been passed in favor of sanitary science. The medical profession and journals generally commend it; and never were its prospects brighter in Great Britain than at the present time.

Perhaps the science has not created so general interest nor taken so strong a hold in the United States as it has in Great Britain; but still its history is one of marked interest. Let us notice a few of its salient points. From 1830 to 1840 Dr. John Bell conducted the *Journal of Health* in Philadelphia, which very ably advocated the principles of hygiene. In 1835 Dr. Jacob Bigelow, in the annual address before the Massachusetts Medical Society, pronounced a certain class of diseases "self-limited" in their character, and urged that they should be treated accordingly. This was a marked step in the way of medical reform, which, with other influences, led to what was called the "expectant treatment of disease."



In 1842 was issued the first registration report of births, marriages, and deaths in Massachusetts, and has been continued annually till we have now the forty-fourth report. Sanitary science has been greatly advanced by facts and arguments derived from these reports. Several other states have followed the course of Massachusetts in establishing registration departments. No one agency can do so much to advance the cause of vital statistics as such registration reports. The application and progress of sanitary science depend much upon a knowledge of vital statistics; and the more thoroughly these are understood, the better for the cause of sanitation.

In 1844 Dr. Elisha Bartlett published in Philadelphia a work on the "Philosophy of Medical Science," and, in urging upon the profession a better knowledge of the cause and nature of disease, said,—“The next thing to be done is to find out the best methods of modifying and *preventing* disease. This is the great mission which now lies immediately before us: *this is to constitute the great work of the next and succeeding generations.*” This statement was made two years before that of Dr. Forbes, already quoted. Both these men, living in advance of the times, were distinguished for original thought and independence of expression; they have proved themselves true prophets.

In 1845 Dr. John N. Griscom, of New York, made an urgent appeal to the mayor and city government in behalf of the “sanitary condition of the laboring population of the city.”

In 1847 the American Medical Association was formed, and provided for a section on “Public Hygiene.” Many excellent papers on this subject will be found in the Transactions of this association.

In 1850, under the direction of the legislature of Massachusetts, an elaborate report on the “Sanitary Survey of the State” was issued by a board of commissioners, of which Lemuel Shattuck, Esq., was chairman.

In 1860 a very important “Sanitary Convention” was held in Boston in the interests of quarantine. As this agency has been mainly confined to the prevention of the extremely contagious diseases, the general interests of sanitation have not formerly come into account. But at the convention referred to, a committee was appointed, of which Dr. A. N. Bell was chairman, which made an exhaustive report, containing hints and suggestions of great value. Dr. Bell is now the editor of that popular magazine, *The Sanitarian*, published in New York, which has done excellent service for sanitary science.

In 1860 one of the most brilliant addresses ever given in this country was delivered before the Massachusetts Medical Society by Dr. Oliver Wendell Holmes. As this had a direct tendency to promote sanitary science, the address and its reception deserve special notice. At this time the importance of a more thorough study of *Nature* in medical practice had been urged on the profession in previous addresses and other medical papers published. In pursuing this line of thought, Dr. Holmes expressed very positive opinions, accompanied with reasons and

illustrations, that too much medicine altogether was given by the profession, and that there were great evils arising from over-medication. For this opinion Dr. Holmes was not only severely criticised by prominent physicians, but denounced and abused, if harsh language could do it. But reaction soon followed this violent attack. The discussion led many physicians to a new and more careful study of the natural laws of disease and the true effects of drugs. Great good came out of this controversy. Dr. Holmes, instead of being injured, gathered new laurels. Many young physicians, seeing the propriety and force of his strictures, struck out a new course in their practice.

The most efficient agents of all for establishing and applying the principles of sanitary science are boards of health. The first state board of health in this country was formed in Massachusetts in 1869, since which time boards have been started in nearly all the states of the Union. In 1872 the American Public Health Association was organized in New York. This is the most extensive and powerful agency of the kind in this country, and we think we may safely say in the world. It has published eleven large volumes, which contain a greater and more valuable collection of papers on sanitation than can anywhere else be found. The primary object of the Association, as stated in its constitution, is the "advancement of sanitary science." A careful examination of the contents of these volumes affords the strongest possible evidence that the Association has done a grand work. Here almost every question connected with the science, in all its diversified applications, is found discussed. Some of the papers show great research and an originality of thought which might be elaborated into a volume. Besides its published works, the Association has greatly advanced the interests of sanitary science in all the cities where it has held its annual meetings.

#### RELATIONS OF SANITARY SCIENCE TO THE PROFESSION.

While the success of this science depends mainly upon physicians, there is a wide difference in the interest which they take in it, as well as in the sacrifices which they are willing to make for it. Let us inquire who, and how many, of our physicians have been actively engaged in this reformatory work. The number, compared with the whole profession, is not large,—in fact, is very small. Those engaged in this work are widely scattered, both in city and in country, and are generally active with the pen and tongue, so that they seem more numerous than they really are. There are, it is true, great numbers in the medical profession who are kindly disposed to sanitary reform, and speak highly of it in their practice, but at the same time are unwilling to make much sacrifice to advance its interests.

Unlike many other reforms and good works, there is a direct antagonism between the interests of this profession and sanitation. The support of this profession depends mainly on the *cure of disease*, not its prevention. Every step in this reform diminishes more or less profes-

sional income. There is no trade or speculation in this reform. When a person has spent years in study, and made large investments to secure a livelihood, how can we expect he will sacrifice these interests? There is probably no class of men engaged in professional or other kinds of business to whom appeals of so complex and antagonistic a character are made for services. The result depends much upon the education and the moral training of parties. On the one side stands out the highest welfare of the individual and society in respect to health, while on the other side the physician is tempted to make his own interests paramount to all others.

Let us for a moment consider his position. In choosing this profession the pecuniary considerations were undoubtedly most powerful; and, then, in his early preparations and through his whole course of study compensation for professional services has been constantly kept in mind. The whole drift of medical study and teaching, by sickness or from books, has express reference to the treatment and cure of disease,—not, as we may say, its prevention. Add to this the most implicit faith that all classes generally have in drugs, together with the crowded state of the profession, it will be seen that the physician is virtually constrained to have an eye constantly on his business. It is true that in medical studies, in lectures, and in books a great deal is said about the charitable aspects of the profession, and that it is always expected to give a large amount of service to the poor.

It is just to state here that the claims of the sick poor have been most liberally responded to by physicians, and that no other profession or class of men do so much for the poor as the medical profession. But this work of charity has its equivalents: it secures to the physician a stronger hold in the affection and confidence of the people, and, in different ways, tends to increase his business. But to engage actively in means to prevent disease, not simply in one instance, but in case of great numbers, this is very different: it cuts off directly the support of the physician. Such action is based upon a love of humanity, of philanthropy,—a higher range of motives than that of giving services to the sick poor. It appeals to the very highest class of motives, not simply to save expense and relieve suffering, or improve health and prolong life, but to elevate mankind, and increase physically, mentally, and morally the sum of human happiness. Such are the legitimate fruits of sanitary science.

Considering the powerful pecuniary interests of the profession, and the disinterested motives requisite to engage in sanitation work, it is rather surprising that so many members of the profession have from time to time engaged heartily in advancing sanitary science. The main object must have been the promotion of health, the diffusion of useful knowledge, and the enlightenment of mankind generally in respect to the laws of health and life. In some few instances it might have been prompted by pecuniary considerations,—the individual holding some official position, or seeking one. But these are exceptional cases. Our state and



municipal authorities have made such small appropriations for public health that the salaries offered to medical men are not numerous or large enough to be very attractive. In this respect Great Britain is far ahead of us. The promotion of the public health has become there a part of her government machinery. The whole kingdom is divided into some fifteen hundred districts, over each of which a medical officer of health is appointed, with salary graded according to the services rendered.

Besides this provision, and showing the interest of the government in sanitary matters, there are over one thousand inspectors of nuisances appointed, in charge of as many districts. This inspection proves of great advantage, not only directly in preventing disease, but by dispensing information among the people they become helpers in the work. The medical appointments in Great Britain are made on the ground of special training and qualifications for this kind of work, and the same persons are continued in office for years. Thus there is a wide difference between the interest in sanitary science in Great Britain and in the United States. In the former the science receives a powerful support from the government, and a large amount of means is annually distributed among its advocates. Besides, there is on the part of the people more general intelligence on the subject, a higher appreciation of the benefits of the science, and a more ready disposition to coöperate in carrying on this reform. Though the science has been making advances in these respects in the United States, there is much room for improvement. Our national government is not doing what it ought for public health; neither are the state or municipal authorities making the appropriations for it which they should.

Most of the contributions to sanitary science here have been voluntary. This reform has been carried forward by men heartily interested in the work; very few seeking or expecting any remuneration. The reward for such services does not consist in dollars and cents, nor in the plaudits of the multitude, but in "the consciousness of duty done and noble deeds performed." A distinguished medical writer lately made this remark: "The most important work that sanitarians are doing at the present day is 'sowing seed which in time will yield abundant harvest.'"

And never in the history of medicine was there such a combination or circumstances so favorable to improvement in the practice of medicine. Never before has there been such earnest inquiry on the part of the profession to ascertain the true causes of disease. It has been found in the moral world that in order to eradicate great evils their primary causes must first be removed. So in the prevention of disease, the same course must be pursued. This accords with the teachings of sanitary science. Leading members of the medical profession have here been doing noble work.

#### SANITARY IMPROVEMENTS IN MEDICINE.

Some twenty-five years ago Sir Joseph Lister, of Edinburgh, made a great discovery for the prevention of disease by introducing what has

been called "Antiseptic Surgery." It had been found prior to that time that wounds and surgical operations were frequently followed by an inflammation which proved fatal. Surgeon Lister discovered that by an application of antiseptic dressings, patients were more sure to recover from the most dangerous operations. It is, moreover, found that antiseptics can be applied to many diseases, as well as to surgical cases, which check their progress and aid essentially in the recovery. It is now admitted that a great amount of disease is thus prevented and a multitude of lives saved.

Again: In this same line of prevention, there has been made within a few years one of the greatest discoveries ever made in the history of medicine—that some of the most dangerous diseases are produced by infinitely small animalculæ called bacteria, and other micro-organisms. This subject is now undergoing most thorough investigations in Germany, France, and Great Britain. If means can be devised whereby these bacteria can be destroyed, or their existence eradicated from the system, it will prevent a vast amount of disease.

Again: There seems to be a prevailing impression in the medical profession that important changes are about to take place in the treatment of diseases. This sentiment is foreshadowed in a variety of ways, and many facts and illustrations might be cited in proof of the same. The most noticeable instance is the following: Dr. Austin Flint, of New York, was invited last year by the British Medical Association to give an address this year before that body. Dr. Flint died suddenly in March, but his address, by singular forethought, was found prepared for this occasion, which has since been published. The very title of the paper is significant,—“Medicine of the Future.”

No physician in the United States could discuss this subject with greater propriety and force than Dr. Flint, and, inasmuch as he was to voice the medical profession in this country before the highest medical body in Great Britain, it shows the importance he attached to this topic in its selection. At the same time, in presenting these views, he must have been pretty well assured that they would be cordially received by the leading members of that association. After recounting in the forepart of this address the changes that had taken place in his own experience in medical practice, he says,—“We are entering upon a revolution in medicine. It is bewildering to project the thoughts into the future in order to foresee the changes which will be brought about in the coming half-century in our knowledge of the correction of diseases, and the results as regards their prevention and treatment.”

He expresses the opinion that hygienic agencies will be employed hereafter far more than they have been; that the normal conditions of health and the recuperative powers of nature will receive greater attention, and less dependence will be placed upon drugs and other artificial means. In referring to bacterial etiology, he says,—“Here open to the imagination the future triumphs of preventive medicine in respect to all classes of diseases.” When the medical profession, says he, “shall

employ all the preventive measures possible, and the best remedial medicines, disease will be more successfully treated, and the profession will have reached a high ideal position."

Alongside of this testimony we will quote the opinions of three distinguished English physicians, who have given special attention for many years to sanitary science.

Says Dr. B. W. Richardson,—“The influence which sanitation will exert in the future over the science and art of medicine promises to be momentous. It promises nothing less than the development of a new era; nor is it at all wide of the mark to say that such new era has fairly commenced. With the progress of sanitary science we must expect to see preventive medicine taking the ascendancy. With true nobleness of purpose, true medicine has been the first to strip herself of all mere pretences to cure, and has stood boldly forward to declare as a higher philosophy the prevention of disease. The doctrine of absolute faith in the principle of prevention indicates the existence of a high order of thought, of broad views on life and health, on diseases and their external origin, on death and its correct place in nature.”

Says Dr. Alfred Carpenter,—“The science of disease-prevention is destined to alter the whole field of medical practice; to render obsolete much of our present knowledge as to the history of diseases and the measures which are now required for their treatment. The inquiry must come as to how the increase of disease is to be prevented, rather than, having arisen, how it is to be cured. This will apply to every kind of complaint, and will not be limited to any one class.”

Says Sir Henry Acland,—“In addition to treatment and cure of disease, whatever be the duty of individuals, medical science and art collectively must aim as a whole, 1st, At the preservation of health; 2d, At the averting of disease from individuals and the public generally; 3d, At rearing healthy progeny for the family and the state by probing the laws of inheritance; and, 4th, At procuring legislation effectual to these ends. It claims, therefore, a voice in moral education as well as physical training. It holds a duty in relation to the diminution of vice, for the sake not only of self-destroying victims, but more for the sake of the innocents whom they ignorantly slay.”

It would seem that in the opinion of Dr. Acland sanitary science covers very important ground. This opinion may be accounted for in part from the fact that he has long been a professor at the Oxford University, has had large experience in educational matters, and understands the full import of physiological laws. If the preservation of health or the prevention of disease is accomplished by improving the organization, a multitude of other improvements follow; and the more perfect the former, the greater will be the latter.

There is one method of preventing disease, referred to by Dr. Acland and other writers, which has never received the attention it deserves, that is, by the observance of the laws of inheritance. Within a few years this subject has been considerably discussed in the United States



and Great Britain, but few seem to appreciate fully the magnitude of its bearings on sanitation. The diseases considered preventable—of which there are nine or ten—come under the zymotic class, but there are two other classes, called constitutional and local, each larger than the zymotic. Thus far sanitary science has expended its principal force upon this class; but supposing its agencies could be brought to bear equally upon the prevention of diseases in these two classes, what a vast amount of good it would accomplish! Let us explain. For many years there has been a class of diseases called “hereditary,” because the predisposing causes were inherited, because these are transmitted from generation to generation, and thus run in families. Now, if those ancestors were free from any taint, or, in other words, had perfectly sound and healthy constitutions, the seeds, the germs, the predisposing tendencies of disease, would not be transmitted. Let us carry out a little farther this line of argument.

The same kind of evidence which proves that the germs of, or predisposition to, disease are transmitted in a single instance, applies to all others of a similar character; and the legitimate inference is that there must exist in nature a great general law. Such a law, we believe, exists, and is based upon a normal standard of physiology,—a standard for the government of the human body, wherein all its parts are perfect in structure, and its organs harmonious in their functions. This standard of organization constitutes the highest measure of health; is free from all kinds of weakness, as well as predisposition to disease. But, unfortunately, we do not find such organized standards in the present state of society—only approximations; and the nearer individuals or families approach this standard, the sounder the constitution, the less disease; whereas, the further the deviations diverge from this standard, the greater are the weaknesses and liabilities to disease. Here come in the laws of inheritance,—starting not in a perfect, healthy organization, but in conditions of the body where changes of some kind have taken place in the vital forces of the system. To understand and utilize these laws, they must be reduced to some system; the distinct relations between the causes and the effects must be traced out, till we find a great general law serving as a standard of appeal, or as a regulator to all the minor ones.

There can be no question but that in the inheritance of *morbid tendencies* we have one of the most fruitful sources of disease. This will become more patent in proportion as the principles of physiology shall become better understood in their connection with hereditary influences. Without attempting to describe the various ways in which the seeds of disease, or the predisposing causes, are transmitted from parent to child, we may say they are *manifold*,—in organization or function; in defective or abnormal structure; in the weak or excessive development of this or that organ; in the general want of balance in the organs, and of harmony of function; in the quality of the blood, and the marked predisposition to certain diseases, like scrofula and consumption.

A class of diseases called “hereditary” have existed since the days of Hippocrates, and have always been considered difficult to treat, and still

more difficult to cure. Very little attention has been paid to these complaints by sanitarians, as it was supposed they could not be easily prevented. But this is a mistake: they originate from the violation of law by human agency: they can, then, certainly be prevented.

It is admitted by physiologists that all parts of the body can be changed by proper exercise and the law of nutrition,—some parts increased in size and strength more than others,—so that in this way a far greater measure of health can be secured. It is found that decided improvements can be made in the physical system during the lifetime of an individual, and that in three or four generations the human constitution may reach a higher state of perfection. If nature has, therefore, established a physiological standard of health,—which is seldom, if ever, liable to disease,—and at the same time it is well understood this standard is attainable, should not the greatest possible efforts be put forth to secure and maintain this standard? It is here in this field where the germs (the seeds), the primary causes of a vast amount of disease, are to be forestalled. In this warfare with disease we have been content to lop off a few branches, leaving intact the trunk and roots. We have been battling the enemy in the outskirts, without attempting to take the citadel. Here is a great work for sanitary science; here this science is destined to reap its richest harvests. It may take time; but reforms in which the highest welfare of mankind are involved never remain stationary.

#### SANITATION OF THE FUTURE.

In drawing this discussion to a close, a few suggestions may seem appropriate. While quoting from Dr. Flint's address on "Medicine of the Future," the inquiry arises, Is not sanitary science also to have a "*future*"? Most assuredly. Its past history is very brief, and different from that of medicine. This extends back thousands of years, and its whole history is made up of a succession of changes. It is not so with sanitary science. A half century covers its whole existence. Its only change has been the constant unfolding and applying of Nature's laws to the improvement of health and the prevention of disease. It has not been found necessary in its progress to try experiments or apply any new medicine. As sanitation is based upon the laws of nature, its course cannot change or go backward. *Excelsior* is its motto.

This sanitary movement has certain advantages over other reforms. Its success does not depend upon the medical profession alone, nor upon the patronage of government, nor upon any one body of men, but upon all classes,—men and women. The more the people become enlightened on the subject, the more earnestly will they engage in the work, and become at the same time partakers in its benefits.

The history of sanitary science is full of promise for the future. It is really only about twenty-five years since it could be said to have had a fair start. Its doctrines have become deeply rooted, not only in the medical profession, but among large numbers of the laity scattered throughout this country and Europe. The press is committed decidedly

in its favor. Its teachings are found broadcast in books, journals, pamphlets, reports, and newspapers. Its principles are being taught and applied both in our common schools and in higher institutions of learning. Boards of health have been organized in all large cities and in nearly every one of the United States. The benefits already derived from this science cannot be estimated in figures or described in language. The pestilence in this country has been stayed; epidemics have been checked; a vast amount of sickness has been prevented, and a great multitude of lives saved. In Great Britain, where the science has made greater progress and more exact accounts have been kept, upon Mr. Edwin Chadwick's authority, based on the registrar-general's report, it is asserted that the lives of 30,000 persons are annually saved, and 300,000 cases of sickness every year prevented, by means of this science!

The two following statements, though once quoted, are so prophetic that they will bear repeating:

Forty-two years ago Dr. Elisha Bartlett said, in Philadelphia, while urging upon the profession a more thorough knowledge of the causes and nature of disease,—“The next thing to be done is to find out the best method of modifying and *preventing* disease. This is the great mission that lies immediately before us; this is to constitute the great work of the next and succeeding generations.”

Forty years ago Dr. John Forbes, in an address to his brethren, said in London,—“Redoubled attention should be directed to hygiene, public and private, with a view of *preventing* diseases on a large scale, and individually in our sphere of practice. Here the surest and most glorious triumphs of medicine are to be achieved.”

Ten years ago Dr. Henry I. Bowditch, of Boston, who has given more thought to this subject than any other man in this country, said, near the close of his work on “Public Hygiene in America,”—“We stand now at the very dawn of the grandest epoch yet seen in the progress of medicine. While philosophically, accurately, and with the most minute skill, studying by means of physiology, pathological anatomy, chemistry, the microscope, and, above all, by careful clinical observation, the natural history of disease and the effects of remedies, our art at the present day looks still higher, viz., to the *prevention* of as well as to the *cure* of disease.”

These testimonials speak for themselves. They need no comment. The predictions here uttered are certain to be fulfilled. The glorious triumphs spoken of will surely be achieved. Individuals, organizations, and institutions may perish, but these principles will live and advance step by step, from one triumph to another, from one glory to another.

It is related of a distinguished statesman, that, in the immediate prospect of death, he expressed the desire that if possible he might live fifty years more to see certain reforms in government carried out. So the sanitarian, in forecasting the future, might well wish to live another half century, in order to see the great changes and improvements in society brought about by the principles of sanitary science.



## X.

### THE BEST METHODS AND APPARATUS NECESSARY FOR THE TEACHING OF HYGIENE IN THE PUBLIC SCHOOLS, AS WELL AS THE MEANS FOR SECURING UNIFORMITY IN SUCH INSTRUCTION.

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FOREST, ONTARIO, CANADA.

In our efforts to promote sanitary reform and improve the physical condition of the people, we must consider not only the best way to enact and enforce sanitary laws, but also the best method for disseminating among the masses an intelligent conviction of the necessity and benefits of a national system of hygiene.

Practical experience has demonstrated that the work of educating the people in all that pertains to public hygiene is a most important factor in the successful accomplishment of our objects as sanitarians. At every step in our legislative halls, with local health authorities, in communities, and in our experience with individual citizens, we encounter more or less opposition arising from a lack of intelligent comprehension of the causes of disease, the best method of preventing the spread of epidemics, and generally of the preservation of public health.

In its broadest sense, then, national hygiene demands the coöperation of all those interested in educating the public in the best mode of life and action, of the physician who by daily contact with disease in every form may discover its origin and potency, of public teachers in every department of public instruction, as well as our legislators and every patriotic citizen.

It is a well recognized principle, especially in a free country where the sovereign power is lodged in the body of the people, that popular sentiment must proceed in advance of legislation in order that successful enforcement of law may be secured. How best to educate the people in public hygiene thus becomes the most important question in relation to public health.

And again : There are social causes of disease which no legislation can reach, because we cannot encroach upon the private rights of citizenship, and invade the sacred hearth of homes in this land of freedom and liberty, in order to eradicate the very many causes of disease to be found in the social and personal habits of individuals. These social causes of suffering and death must be driven out by the advancing intelligence of a people educated in the principles and laws of sanitary science.

We can, under our system of universal education in our public schools

and institutions of learning, directly and quickly instruct the rising generation in sanitary science. The immediate effect of this instruction is to promote the health of the youth, and to influence public opinion through our schools, and the ultimate effect will be to render the enforcement of sanitary legislation an easy task by having first educated the mass of the people to appreciate the benefits resulting from an intelligent obedience to the laws of health.

The aim of teaching hygiene in schools may therefore be stated in general terms,—

1. To inculcate sound national views regarding the necessity of obedience to laws of health.
2. To secure willing obedience to the enforcement of sanitary law.
3. To correct social and personal habits which are constantly operating as causes of disease.

I. In the first place, then, let us consider the influence of the teacher, and how this may be utilized in educating the people by theoretical and practical instruction in public hygiene.

II. In the second place, sanitary supervision of all schools, administered by a special department as a means of securing thorough, practical, and uniform instruction in school hygiene. In connection with this department, instruction by special teachers in normal and model schools, where teachers in training are being prepared for professional examinations.

III. Also the use of a text-book in schools as a book of reference, from which notes may be taken for class-work, and instruction thus adapted to the different grades of pupils by each teacher as circumstances require. By this method, at the discretion of the teacher, oral lessons, practical illustrations on the board, short, familiar lectures, may be given, or practical application in the school-room of principles of ventilation, heating, lighting, etc., may be used as methods of instruction.

I. We may first draw your attention to the preparation and influence of the teacher. Especially in rural sections the teacher's influence extends beyond the limits of the school-room. There are thousands of teachers in this and other provinces of the dominion, as well as in the several states of the Union, who would exercise a wide-spread, beneficial influence in helping forward the work of sanitary reform if their efforts in this direction were aroused and encouraged. How to enlist the active coöperation of this vast army of educators is a question worthy of our consideration.

In Ontario, at present, all teachers are compelled to pass an examination on school hygiene before being declared qualified to enter upon their professional duties. The subjects prescribed include those usually taught in our public schools. In addition to these, however, we would recommend instruction in,—

1. The history of sanitary reforms in countries or localities where it has been proved by actual experience that the strict enforcement of sanitary law has resulted in the saving of human life.

2. The comparative rates of mortality in countries or localities where a partial system, and in countries or localities where a perfect system, of administration of sanitary law exists.

3. The loss of money, life, national energy and resources, and the commercial depression known to have resulted from the invasion of epidemics, all of which might have been prevented by proper precautions.

4. The destruction of human life and talents in the younger portion of communities by consumption, a disease which has grown and extended in our modern school-rooms where bad ventilation and over-crowding have been permitted.

5. The length of life, or comparative death-rates of those engaged in different occupations, showing that close confinement in the vitiated atmosphere of ill-ventilated rooms, in-door employment, and sedentary habits operate as causes to shorten human life.

6. The saving of human life accomplished by vaccination, isolation, and other preventive measures, and the necessity of enforcing laws to compel people to submit to these necessary requirements.

Instruction of teachers on these points would tend to arouse an enthusiasm in favor of sanitation that would secure their influence not only in daily class-work, but also in their relations with trustees, local health authorities, and the communities generally.

(1) In order to illustrate the tendency of such an influence, and what it might accomplish, allow me to draw your attention to the results of an inquiry into the sanitary condition of our schools in Ontario.

An inquiry was lately made by our provincial board of health, with a view of obtaining accurate and reliable information as to the present sanitary condition of our school-houses and grounds. The teachers and public school inspectors responded, and furnished full information on these points. The alacrity with which this information was supplied, and the poor sanitary condition of many school-houses, showed that while teachers and inspectors were interested in public hygiene, trustees and local health authorities were regardless of the whole matter.

The local authorities, whose duty it is to arouse public attention to the necessity of supplying means to remove the many causes of disease existing in and around school-houses, are too frequently influenced by false notions of economy, and prefer to sacrifice national health rather than expend money necessary to remove these causes. Among other prominent features in the report were these :

That 8 per cent. of our schools afford a cubic air space of from 500 to 1,000 cubic feet for each pupil.

About 5 per cent. reported over 600 cubic feet.

“ 3 “ “ “ 700 “

“ 2 “ “ “ 800 “

“ 2 in every 300 reported over 900 to 1,000 cubic feet.

“ 40 per cent. reported less than 200 cubic feet.

In some cases scholars were confined in an air space of less than 100 cubic feet. Besides this, in many instances no means of ventilation was



provided, rendering it necessary that injurious draughts be created in order to admit fresh air into over-crowded rooms.

Then, with regard to water-supply, there were no means reported for testing the purity of water. About 38 per cent. of those reporting stated as their opinion that the drinking-water was impure, about 60 per cent. reported having wells situated on the school grounds, while many were not so fortunate, but were obliged to trust to the generosity and good judgment of their neighbors as to quantity and quality. The location of the wells in relation to the outhouses was also in many instances very objectionable. The character of the latter, in the majority of cases, exhibited great carelessness and disregard of the laws of health and comfort.

Any person who read this report would not be surprised to know that our provincial mortality returns record a higher death-rate from diphtheria and typhoid fever in rural sections than in our largest cities. In rural municipalities greater carelessness regarding water-supply, drainage, location, and management of out-buildings operates as a cause to produce this condition of things. Ill-ventilated school-rooms also may account in many instances for the large percentage of consumption in certain rural localities.

Such facts as these indicate that indifference on the part of the local health authorities and the public generally must arise from ignorance regarding public hygiene and all that sanitation has accomplished in the world, as well as what may be done by an intelligent obedience to sanitary legislation and personal hygiene. Teachers and public school inspectors, who were prepared by a proper training to instruct the people, and to contend against the ignorance and prejudices that interfere with the progress of sanitary reforms, would find abundant opportunities for accomplishing a great deal of useful missionary work.

(2) Instruction of teachers in the relation between physical and mental growth or development of pupils, especially the younger pupils.

Now that higher education is becoming more universal and more intensely competitive, that success is estimated by the results of examinations, the national interests demand the inquiry, Are we not encouraging erroneous methods of education? Are we not in danger of stimulating the receptive and memorizing power at the expense of that educating or training method that gives mental strength, stability, and energy? Under the competitive prize-giving stimulation the teacher's reputation is frequently earned at the expense of the future mental and physical vigor of the pupil when he arrives at manhood. The results are nervousness, excitability, brain exhaustion, mental languor, and sometimes insanity. This injurious method, universally adopted under our national system of education, must result in national degeneracy. The nervous, over-strained brain in one generation yields weakened mental power in the next.

After the seventh year school life commences. The physical organization is firmer, the brain is more fully developed, and the child is pre-

pared for exercise of the higher mental faculties. During the next few years good judgment is required on the part of the teacher in skilfully adjusting the proportion of physical and mental training. The half-time system proved the advantage of a careful regulation of physical and mental exercise. The observations of Edwin Chadwick on the half-time system led him to remark, "That as children gained in bodily condition by the reduction of their physical labor, so did they gain in mental condition by reduction of the time devoted to mental labor." The teacher is required to adapt his method of instruction to the age, physical and mental capabilities, temperament, and peculiarities of constitution, all of which differ more or less in each pupil under his charge.

Mental activity is quite as necessary to health as physical exercise; and to be beneficial, both must be directed in accordance with natural laws. Physiology, in relation to mental exercise and development, should be part of the instruction in preparing the teacher for his work.

The brain requires one fifth of the blood in performing its functions. Being unable to supply nutrient material for itself, in its operation, it is destructive of its own elementary structure. It is, therefore, entirely dependent on the vegetative life of the body; consequently a healthy physical organization is essentially necessary as the foundation for mental growth and development. Pure and healthy blood quickens, stimulates, and invigorates brain functions, and permanently builds up in the growing youth firm and healthy brain tissue. Impure blood impedes this natural growth and development. The impure atmosphere of a crowded school-room, combined with an unnatural forced system of education, where school work is done under perpetual worry, anxiety, and want of time, cannot be too frequently condemned. It has been the crying evil of our modern educational methods.

It was remarked, with truth, by a celebrated writer, "That men of great talents are apt to do nothing for want of energy, vigor, and firmness of purpose." The injurious results of over-stimulating the mental activity of bright and active pupils, at the expense of the physical health, strength, and energy, are acknowledged by all. The words of Herbert Spencer, as quoted in our *Manual School of Hygiene*, are well worth repeating here: "Success in the world depends on energy rather than on information; and a policy which, in cramming, undermines energy, is self-defeating."

A knowledge of the relation existing between the influential and automatic functions of the brain, the former representing the will power or energizing force, and the latter the sensori-motor power, is of practical value to the teacher. A certain amount of knowledge of the physiology of the brain would assist a teacher in avoiding erroneous methods of education and routine systems, the fundamental principles of which he does not comprehend. He who comprehends most about the physical and psychological laws of mental activity and development will be best able to pursue rational methods of teaching, and best able to avoid erroneous methods.

(3) Then there is a certain amount of practical instruction and knowledge that every teacher should be familiar with. While we fully recognize the great value of daily instruction by lessons in school hygiene, we must not forget that practical observance of the laws of health, strictly enforced in the daily discipline of our schools, is a most important factor in training the youth for the habitual practice in more mature years of the principles of sanitary science.

In the personal habits of pupils, in the ventilating and heating of school-buildings, in the location of wells, in the character of the out-buildings, in the construction of school-houses and laying out of the grounds, in a proper observance of the purity or impurity of the water-supply, in the enforcement of laws for preventing the spread of contagious and infectious diseases, and in many other things, practical truths may be instilled into the minds of pupils, and impressions made that will never be effaced in after years. During the earlier years of school life, when the perceptive faculties are keenest, when the powers of observation are greatest, and when the plastic nature of childhood renders the mind most susceptible to outward impressions, is the time to surround the growing youth with practical methods and appliances calculated to secure the attainment of a healthy, vigorous manhood.

In this way the construction of school-buildings, and, subsequently, the daily administration of school life on sanitary principles, will certainly lead to the construction and regulation of private dwellings, and the daily management of home life on sanitary principles. Practical sanitary reforms in private life, as well as in public institutions, would thus be attained in a more certain and expeditious way than by voluminous exhortations, however excellent they might be.

This method of practical instruction is to some extent observed in Ontario. The education department requires teachers "to give strict attention to cleanliness and proper ventilation of the school-house, to enforce rules regarding contagious and infectious diseases, to keep the school grounds and out-buildings in a neat and orderly condition, and generally to observe the rules of cleanliness and health." These regulations are attended to in some places, and neglected in others.

Many of our school-buildings have been constructed without any provision for proper ventilation; therefore, in a great many instances it becomes necessary for teachers to exercise their own judgment and discretion in devising such methods as circumstances may permit for accomplishing a suitable system of ventilation. In this way, by ingeniously applying in practice the principles of ventilation, the pupils may be taught useful lessons, and permanent good impressions may be produced.

Other practical lessons may thus be taught on various points, among which may be mentioned,—

1. Principles referring to proper admission of light in the school-room.

2. Simple, ordinary, or qualitative tests for proving the purity of the water-supply, such as permanganate of potass. test.



3. Nessler's solution test. The teacher might, with profit, also prepare this solution before the class, as it demonstrates a beautiful chemical reaction when prepared with potass. iodid. and hydrarg. bichlorid.

4. Argent. nit. solution with sulphuric acid as a test for chlorides.

5. Simple tests for nitrites.

6. Filters should be used, and their operations explained in schools.

7. Dr. Angus Smith's tests for purity of the air. For the use of schools, three bottles of the capacity of 10.5, 9.1, and 8 ounces respectively, would in ordinary cases be sufficient, though a larger number should, if possible, be supplied.

It appears very difficult at present to procure these bottles, as they are seldom manufactured. It would, therefore, be advisable to encourage a demand for these, or other apparatus, useful for testing the purity of air in school-rooms. Pure chemicals should also be procurable easily.

8. Simple methods for testing the sight and hearing of pupils should be taught, such as by test type for sight, and the distance at which the ticking of a watch, or ordinary whispered tones, may be heard, for testing hearing.

The necessity of observing these defects, and having proper measures adopted for their removal, should be alluded to.

9. Methods of enforcing legislative enactments, and school regulations regarding contagious diseases, the forms of notification best adapted, and the mode of recording in a register absentees from causes of sickness. Very often this is neglected because no column in the school register is set apart, or blanks supplied, for recording this information.

10. The operation of the dry-earth system, especially for schools in towns and rural sections.

It has frequently been suggested to me by public school inspectors that a model school-house should be constructed, possessing the best known methods of heating, ventilation, lighting, seating, etc. In a building so constructed the teachers could obtain correct ideas of these principles by seeing them in actual operation. For instance, a normal school building, used for imparting higher instruction to teachers, established in a centre of education, and constructed upon the best hygienic principles, would serve as an illustration of what should be furnished everywhere for school purposes. Such a building, provided with suitable apparatus for testing water, air, and for other experiments connected with school hygiene, would be useful in promoting the advancement of such instruction generally.

II. The method of instructing teachers in training at normal and model schools, and the sanitary supervision or systematic inspection of schools, are both worthy of consideration. Without suitable hygienic instruction of teachers preparing for professional work, and systematic sanitary supervision of schools, we cannot expect to accomplish much in establishing thorough, practical, and uniform instruction in school hygiene.

For this purpose of instruction and supervision there should be a spe-

cial department organized under the direction of a competent and responsible officer.

Such a system of instruction and sanitary inspection would accomplish the following objects :

1. The improvement of the methods of teaching hygiene in schools.
2. The practical application in every school of the best known principles of heating, ventilating, lighting, seating, and the construction and sanitary management generally of school buildings.
3. The uniform enforcement of laws regarding vaccination, and contagious and infectious diseases.

It has been found very difficult to get reports from families where infectious or contagious diseases exist. The laws now in force regarding isolation and detention from schools are not generally enforced in this country. Sanitary supervision of schools would remedy this neglect, and establish a method of practical instruction on preventive measures in all our schools. Now, in Ontario, this important matter is left entirely in the hands of the local authorities, who have not generally acted with diligence or promptitude ; consequently the opportunity is being lost for instructing pupils in the practice of the methods for preventing the spread of contagious and infectious diseases. For this purpose, particularly, is systematic inspection of schools required.

4. The regulation of the physical and mental training of pupils.
5. The administration generally of sanitation in school life.
6. It would also secure uniformity in instruction in all public schools.

The question of sanitary inspection of schools was discussed at the Geneva International Congress on the 6th of September, 1882, and the conclusions arrived at were reported to the Ontario Board of Health by Dr. Covernton, first vice-president of this association, who, as delegate, represented Ontario at that meeting.

In order to state as briefly as possible the principles there submitted, I take the liberty of making a few extracts condensed from Dr. Covernton's valuable report :

1. The appointment of a school physician-in-chief, having consultative and deliberative functions with the minister of public instruction.
2. The appointment of local school physicians, who should supervise certain assigned districts, containing not more than 1,000 pupils, and have consultative and deliberative functions with the school principals.

The duties of the local school physicians to be,—

1. To regularly inspect school-rooms as to lighting, seating, ventilation, and heating, the condition of the school grounds, water-supply, out-houses, and the manner of dealing with cases of contagious or infectious diseases.
2. In cases of the erection of new buildings, to give an opinion as to the sanitary conditions, and superintend, during the erection, the methods of heating, ventilating, seating, and disposal of excretæ.
3. To measure pupils every six months, and place them at seats or desks conformable to the height of each.

4. To determine the condition of the refraction of eyes of pupils, and reduce the number of pupils where the light is imperfect.

5. He should also be consulted in the preparation of the programmes of studies.

6. Every contagious malady that a pupil suffered from should be communicated to the school physician. He should not grant permission to return to school until he is satisfied that all danger of infection has disappeared.

7. To note in a register all interesting hygienic peculiarities of the school, and particularly the changes in vision of pupils, these registers to be submitted each year to the school physician-in-chief, who should publish an annual report on the hygienic condition of the schools under his control.

Personal inspection of schools by a special commission under the direction of the state board of health of New York yielded a valuable report published in 1882, with useful suggestions, all of which proves the advantage of sanitary inspection.

It also shows what may be accomplished by a regular systematic supervision of all schools in the way of securing uniformity of instruction by practical application of the principles of hygiene.

In Ontario it was hoped that each local board of health would appoint a medical health officer who would, with the request or concurrence of the school trustees, perform the duties of local school physician; and in the local health by-laws provision is made for such an appointment. Owing, however, to the want of appreciation on the part of the proper local authorities of the value of the services of such an officer, little or nothing has been done to encourage the scheme.

It appears, therefore, that some more direct way to accomplish the work of sanitary supervision of schools is required. Reports on the hygienic condition of schools indicate that at present the sanitary regulations of the education department, which are very suitable in many respects, are not usually observed. Sanitary supervision of schools would secure not only effectual, theoretical, and practical instruction, but also a uniform system of instruction, as well as the enforcement of sanitary regulations for schools. This practical method of dealing with the question would be the best method of instruction, especially for younger children.

III. In conclusion, then, we would suggest,—

1. The organization of a special teaching department for the purpose of giving instruction in school hygiene to teachers in training in normal and model schools.

2. Lectures, practical experiments in testing the purity of water, air, etc., and practical illustrations of the best methods of heating, ventilating, etc., to be given in normal and model schools.

3. An authorized text-book on school hygiene, to be used uniformly by teachers as a reference book, from which notes may be taken, and lessons or practical illustrations adapted to the various grades of pupils.



4. The systematic, thorough, and regular inspection of schools under the direction of a competent and responsible officer. Reports of these inspections to be annually published, with inferences and suggestions for the benefit of schools and instruction generally.

By this method, or a similar one, uniformity and efficiency would be secured, and practical instruction imparted in all our public schools, the results of which would be a more general appreciation of the benefits arising from an observance of the principles of public and personal hygiene.

## XI.

### SIX YEARS' SANITARY WORK IN MEMPHIS.

BY G. B. THORNTON, M. D., PRESIDENT OF MEMPHIS BOARD OF HEALTH.

The interest taken in the public health and sanitary reforms in the city of Memphis, since the yellow fever epidemics of 1878 and 1879, by sanitarians, its citizens and others, by reason of their business relations, has suggested this essay. Moreover, as this Association has been invited to hold its next annual meeting there, it is thought proper to give in detail some information concerning these reforms and their results which might be of interest to those engaged in the study of sanitary science.

No city in the country, except, perhaps, New Orleans, has attracted more attention from a sanitary point of view, or suffered more in public estimation from a disregard of the laws of public hygiene, nor has any city ever recuperated more rapidly, or exhibited in the same length of time a more vigorous vitality. There is now reason for entertaining the hope that the business and social life of Memphis will never again be disturbed by serious epidemic disease. It is claimed that more sanitary work has been done there in the given length of time than in any other city of like size in the country; and the good results already obtained encourage the belief that a higher health standard may yet be reached, and successfully maintained, by persistent effort in the methods and sanitary reforms instituted by the government in 1879.

The great losses to the city by the epidemics before alluded to, in life, removal of its citizens, diversion of its trade, and, as a consequence, depreciation of its property both real and personal, with the danger apparent of still further shrinkage from bad repute, induced the government and people to do all in their power to reclaim their lost wealth and influence by removing the causes which led to and resulted in this state of things. These reforms, as they related to Memphis, involved two questions,—one of local sanitation, and the other the prevention of the introduction of infectious diseases from elsewhere.

Before discussing its local sanitation and inland quarantine after it grew to be a city, it is well to go back to a period prior to epidemics, and direct attention to some of the natural conditions that from the first were against health and life. The topography of the ground upon which the city was built, and a want of sanitary precautions as it grew from an unimportant river village to an important commercial centre, is an interesting study in this connection, and plays an important part in those factors which maintained a high death-rate from endemic diseases,

and facilitated the spread of exotic diseases when introduced at seasons of the year favorable to their spread. The high bluff upon which the city stands affords many natural advantages over the surrounding country and other localities of the Mississippi valley; and these advantages alone were too much relied on for preservation of the public health. With the experience of the past, and aided by the light of sanitary science, it is instructive to follow the growth of this city, and note the changes in grading high places, filling up depressions, diverting natural water-courses, together with accumulations of filth and waste, incidental to population, thoughtlessly left to pollute the soil, contaminate the drinking-water, and add evil influences to natural unsanitary conditions. To correct these evils, both natural and the result of ignorance and negligence, is the work of the sanitarian, that requires time and money, as well as the education of a community out of its primal prejudices. The site of Memphis, on the fourth Chickasaw bluff, near where Wolf river empties into the Mississippi, in latitude 35.08, 315 feet above sea level, is naturally one, notwithstanding abrupt elevations and deep depressions, requiring the skill of the engineer to prepare it for habitations.

Bayou Gayoso, as will be seen by reference to the accompanying map, rising in the southern suburbs of the city, runs in a north-westerly direction, nearly through its geographical centre, and empties into Wolf river. This bayou and its branches afford the natural drainage for nearly the whole city, and a large area of country east and south of it. It may be described as a deep, crooked ravine, widening near its mouth, having a fall of some ninety feet in four miles, through which in periods of heavy rains the water rushes in great volume, while in the intermission of rain-fall it shrinks to the proportions of a rivulet, excepting in the spring, when its banks are filled by the back-water of the Mississippi river almost to the heart of the city. This bayou has always been an important factor in considering the question of local sanitation.

Memphis of to-day presents very few of the features characterizing its early life. The grading of its streets, filling of low, wet places, and the changing or obliterating of many small water-courses, have so altered its physical appearance that the visitor now would scarcely recognize its topography of fifty years ago. The site was first surveyed for a town in 1819. At first the growth was slow;—by United States census of 1830 its population was 663; of 1850, twenty years after, 8,841, 2,480 of which were colored. During these years cases of cholera, yellow fever, small-pox, and other infectious diseases occurred, but there is no authentic record of any epidemic from either. The growth of the city from this date was more rapid, but very little attention was paid to measures looking to the preservation of the public health. Cases of yellow fever are known to have been taken from boats from New Orleans and died in the city and city hospital, from which there was no spread, or at least none to attract special attention, though no precautions were taken to prevent infection. The earliest official records now obtainable, if there



were ever any of the presence of either yellow fever or cholera, are in 1851, which shows ninety-three deaths from cholera. Both diseases are known to have been in the city previous to this period, but there exists no authentic record of the number of cases or deaths from either. There are, however, official records of deaths from yellow fever and cholera in 1852, '53, '54, '55. From 1856 to the close of the civil war in 1865, there are no records. In 1866 an official register for part of the year only shows a total number of deaths from cholera of 402, which is incorrect, and falls short of the actual number.

In 1867 cholera and yellow fever both prevailed. The official register shows 259 deaths from yellow fever,—the first case officially reported in September, and the last in December. The disease this year was not general, but was confined to certain districts. Boards of health up to this time, when organized, were nothing more than advisory bodies, whose advice when given was not followed, their functions and utility not being properly appreciated. They were organized for emergencies, and generally suspended with the disappearance of danger. All attempts toward local sanitation, and all restrictive measures, were of a spasmodic character, being brought into requisition by the presence of epidemic disease for immediate relief, or to allay panic, and, for the time, to satisfy a public sentiment.

In 1873 yellow fever was officially announced in Memphis September 14, though a number of deaths had occurred from the disease previous to that date which were not recognized as such, there being a diversity of opinion among the physicians as to its true character. The last case officially reported was in November. The official record shows 1,244 deaths.<sup>1</sup>

It would seem, with the experience of these several visitations of yellow fever and cholera, that the authorities and people of Memphis would have acquired sufficient wisdom to guard against a repetition of epidemic from either in the future.

The great yellow fever epidemic of 1878, which was general over the South-west, taught Memphis its severest lesson, and marked an epoch in the sanitary history of this country. The population of the city then was estimated at 55,000. The first case was officially recognized in the city hospital August 2. This case was that of a man taken from a New Orleans steamboat, who remained in the city two days prior to his admission into the hospital. On August 3 he was removed by the health officer to the quarantine station, eight miles below the city, on President's island (Mississippi river), where he died. The first case reported by the board of health among the citizens was on August 13, the last death December 10 (a returned refugee); but it is evident that deaths occurred in the city between August 1 and 13, and perhaps earlier, but, as usual, the disease was not recognized, and consequently deaths were reported as from other causes. This, too, may have been the case in

<sup>1</sup> For an account of this epidemic, see report of U. S. Marine Hospital Service for 1883.

some instances during the progress of the epidemic, and *vice versa*. The official register at the health office shows number of deaths from yellow fever, 2,779 in the corporation. The death register of the Howard Association shows 4,913 deaths, and gives name, date, and locality. It includes city and suburbs, and the country adjacent to which they had sent their physicians and nurses. In addition to this, it also furnishes a separate list of 109 names of refugee citizens in whom the disease was developed after leaving the city, and who died elsewhere, making a total of 5,022.<sup>1</sup> This epidemic, which extended over such a vast area and involved such a number of places, so aroused the country to the importance of preventive measures that a new impetus was given to the study and application of sanitary science; and this state of public feeling led to the organization of the National Board of Health and many state and local boards.

At this time the American Public Health Association, then scarcely known beyond a limited membership, first attracted general attention, but has since grown to be international in importance, and is authority on subjects pertaining to the public health interest of the country.

The epidemic of 1878 in this city beggars description, and is only briefly alluded to here, since it attracted such wide attention, and was the cause of special legislation, both state and national, and led to the great reforms which have reclaimed Memphis, and demonstrated what a community can do by well directed energy, aided by science, in face of adverse circumstances. On its subsidence the city was literally paralyzed, besides being in a worse sanitary condition than ever before. A demoralization seemed to pervade the whole community, and a general distrust in the city government to administer its affairs to the best interest of the people was universally felt. The winter passed without an effort being made worthy of mention by the authorities toward sanitary work. The city being bankrupt and largely in debt, without credit at home or abroad, could do nothing. Moreover, there was a want of appreciation of the true state of affairs. All prominent citizens agreed that something should be done, but in view of the condition of the city's business and the general demoralization, it was difficult to determine specifically the best course. The plan finally adopted, while novel and radical, met with strong opposition at first, but proved in the end the wisest.

On petition of the citizens of Memphis, the state legislature, which

<sup>1</sup> See History of the Yellow Fever Epidemic, 1878, by J. M. Keating, Memphis. Published by Howard Association. In this connection the following foot-note to page 116 is herewith added as germane to this subject, though the number of deaths, 5,150, differs from above text:

"The medical estimate (Howard Association Medical Corps) puts the total population during the epidemic at 19,600, and the total sick at 17,600, the deaths as stated being 5,150, a little less than one third. Members of the Howard Visiting Corps, who have resided in the city many years and know it well, and whose business, during the epidemic, it was to visit every ward every day, say that at no time were there more than 20,000 persons in the city, if so many, and that of these fully 14,000 were negroes, leaving only 6,000 white people. Of the 14,000 negroes, 946 died of the fever, and of the 6,000 whites, 4,204 died, being 70 per cent. of the whole number. Not more than 200 white people escaped the fever, and most of these had been victims of it in previous epidemics."

met that winter, took away the charter of the city, and passed a law putting the local government into the hands of seven commissioners, authorized to administer the affairs of the city *as a part of the body of the state*, called the Taxing District of Shelby county. This commission, designated the legislative council, was at first appointed by the governor and subsequently elected by the people. (For detail of this law, see Acts of the General Assembly of Tennessee, 1878-'79.) The new government commenced the work of reorganization and reformation in February, 1879, with an empty treasury, a disheartened community, and the constitutionality of the law creating it yet to be settled by the supreme court of the state. Among other things, this law created a board of health, and defined its duties and jurisdiction. It provided that there should be elected annually by the legislative council a president, who should be a physician of at least five years' residence, with power to appoint a secretary who had graduated in medicine, a health officer invested with police powers, and the chief of police member *ex-officio*, all to give an official bond for the faithful discharge of duty. The president of the legislative council, who corresponds to mayor, was also made a member *ex-officio* of this board. The old health ordinances were revised, added to, and changed, to apply to the new order of things.

The first practical step toward local sanitation, after organization, was to remove from the public thoroughfares and private premises the accumulations of the past six months of garbage, waste, and refuse, of every conceivable character incident to population. The health ordinances were enforced as rigidly as practicable, both in regard to private property and public places. A corps of sanitary police, who reported directly to the board of health, made daily inspections, and brought delinquents before the police court. It is but just to say that the majority of individuals responded cheerfully to the requirements, being impressed with the necessity for such work, while others exhibited an indifference amounting to opposition. A public garbage service, with all necessary appliances, was organized, and has since been operated under the immediate supervision of the health officer. In this early work the authorities were assisted by an organization of citizens known as the Auxiliary Sanitary Association, which was maintained by voluntary contributions, and coöperated with the health authorities, aiding with their means and moral support.

Yellow fever reappeared in July, 1879, and its management which followed demonstrated the fact that a city the size of Memphis may be the subject of infectious disease without the infection extending to other communities. On its outbreak the population was estimated at 40,000. By July 28, by voluntary and forced depopulation, it was reduced to 16,110, of which 4,283 were white and 11,827 colored, and it is estimated that of the total number 5,645 were not protected by previous attack. The first case was reported July 8, the last November 15; number of cases reported, 1,532—white 853, colored 679. Total number of deaths, 485—white 379, colored 106.



From the commencement to the close of this epidemic the national and state boards of health coöperated with the local authorities.<sup>1</sup>

In December following, by invitation of the authorities, the National Board of Health commenced a thorough house to house inspection and sanitary survey of the city, with the view of indicating what was specifically necessary to be done in order to place the city in proper sanitary condition. The commission assigned to this duty furnished the local health authorities schedules of nuisances as the work progressed.<sup>2</sup>

The main points indicated may be briefly stated to be,—

1. A complete system of sewerage and subsoil drainage embracing the whole city.

2. The emptying, disinfecting, and filling with fresh earth all privy vaults, and substituting earth-closets or water-closets in their stead when sewer connections could be made.

3. A thorough cleansing of cellars and premises.

4. Removal of the wooden block Nicholson street pavements (of which there were nine miles, mostly in a decayed condition), and replacing them with some character of stone.

5. The destruction or renovation of all unsanitary houses, and the prevention of the erection of others, either for business or residence purposes, without a permit from the engineer's office prescribing certain sanitary rules.

6. A discontinuance of the use of cisterns and wells containing impure water.

7. The improvement of the public water-supply.

8. A treatment of Bayou Gayoso and its branches.

9. The perfecting and maintenance of a public health service, involving the daily removal of house waste and refuse.<sup>3</sup>

This work has steadily advanced since its commencement, and the health service enlarged each year as the growth of the city demanded and its revenues justified. The average annual current expense for six years in maintaining the health service, exclusive of sewer construction or repairs, which belongs to the engineer's department, is \$22,726.68, as shown by the annual reports of the board of health, to which reference is made for detailed information of expense and work done.

<sup>1</sup> For detailed accounts of this epidemic, see *National Bulletin of Health*, vol. 1, page 85, current number for August 9, 1879. First report of Tennessee State Board of Health, 1877-'80. Essays on this epidemic, vol. 5. Published Reports of the A. P. H. A.

<sup>2</sup> For details of this inspection, see reports of the National Board of Health.

<sup>3</sup> For an interesting report on the sanitary condition of Memphis, and the recommendations for necessary reforms by a commission appointed by the National Board of Health, composed of Dr. J. S. Billings, U. S. A., Vice-Pres. N. B. of H.; Dr. R. W. Mitchell, member; Maj. W. H. H. Benyard, U. S. Engineer; Geo. E. Waring, Jr., C. E.; Dr. Chas. F. Folsom, Sect. Mass. State Board of Health, see Vol. I, page 187, *National Bulletin of Health*, current number for December 13, 1879.

See also a "Summary Sanitary History of Memphis, Tenn., based upon a house to house inspection of the city, November 24, 1879, to January 3, 1880, made under direction of National Board of Health." Report of Dr. F. W. Reilly. See Supplement No. 3, Vol. I, *National Bulletin of Health*, 1880.

## SEWERS.

As much interest has been manifested in regard to the Memphis sewers, which are comparatively new, a brief technical description is given, with their cost and expense of maintenance to date.

The main sewers are located on each side of the bayou and as near to it as practicable, which discharge by one main conduit. The mains are ten, twelve, fifteen, and twenty inches in diameter. Of the laterals about 85 per cent. are six inches in diameter, and the remainder eight inches, except a few short lengths, which are ten inches. The mains, for the most part, are laid with a grade of two inches in one hundred feet, which is the minimum. The minimum grade of six inch laterals is six inches in one hundred feet. At the upper end of each lateral is located one of Roger Field's automatic flush tanks, which discharges one hundred and twelve gallons of water in about forty seconds. It discharges as soon as filled, but it is believed once in twenty-four hours is sufficient. Each tank cost, complete, about \$45, including \$10 royalty. The mains are provided with manholes, and the laterals with observation openings. No surface water is permitted to enter the sewers, the system being designed and proportioned for house sewage only. The house connections are four inches in diameter, and no trap is permitted on the main drain, each fixture being provided with a separate trap. The soil pipes to closets are four-inch cast iron, with lead joints above the ground, and extend four inches above the roof. Each house drain is consequently a ventilator for the public sewer. No trouble has been caused by sewer gas, and the sewers are believed to be comparatively free from it, the constant flushing preventing decomposition and its formation. Occasionally the six-inch laterals have been obstructed by sticks, bones, or some substance not intended to pass through them, which are removed at an average cost of \$10 each, as seen by accompanying table. Occasional deposits of silt or paper are found in the mains, which are easily and inexpensively removed by the passage of hollow metal balls through them. These balls are about three inches less in diameter than the sewers, and being lighter than water, are pressed against the top of the sewer, and are rolled along by the force of the current. The velocity of the ball is less than that of the water, which, in passing, is deflected against the bottom and sides of the sewer so as to thoroughly cleanse it. For the purpose of removing the subsoil water, agricultural drain tiles are laid in the trench, with each lateral on the grade of the sewer, or below it. They discharge into the bayou.

Thirty-eight and a quarter miles of new sewers ( $38\frac{1}{4}$ ) has been laid, which, with the four miles of old sewers, makes forty-two and a quarter miles of sewers now in successful operation, and thirty-six miles of subsoil pipes, and one hundred and ninety-eight flush tanks. The cost of this sewer system since 1880, as furnished from engineer's office, is as follows:

Cost of removal of obstructions, . . . . .	\$3,769.05
Average cost of each obstruction, . . . . .	10.40
Total cost of cleaning main sewers, . . . . .	1,675.35
Total cost of sewer system, . . . . .	316,843.82
Deduct from this obstructions removed, house connections, cleaning, &c., which will leave for sewers proper, . . . . .	291,600.62

The nine miles of wooden block Nicholson pavement has been removed, and there are now twenty-two and a half miles of newly paved streets, mostly with stone and gravel, which has greatly improved the surface drainage.

#### THE WATER-SUPPLY.

As above stated, the supply of drinking-water was first obtained from shallow wells and cisterns, many of which being defective in structure and becoming impure from seepage, the washings of roofs, and other sources of pollution, caused fevers and bowel affections.<sup>1</sup>

Under the operations of the board of health many of these cisterns and wells have been abandoned, and others made unobjectionable. More care is now taken in the construction of cisterns, and the supply from this source is vastly improved. This has contributed materially toward the improvement of the general health of the city. In 1868 the city had a topographical survey made, with the view of establishing a system of sewers and a public water-supply, at a cost of \$43,000.<sup>2</sup>

It has been erroneously thought by many that the present water-works, which furnish the public supply, were based upon this survey. The water company now owning and operating the water-works is a private corporation, and had nothing to do with that survey, only so far as it served their purpose in the construction of their works. The supply at present furnished, though from Wolf river, one of the sources recommended by Mr. Hermany, the chief engineer of this survey, is not from the point indicated by him as suitable, but from one so near the city as to be objectionable, because of the pollutions incident thereto.<sup>3</sup>

It is the purpose of the city government to construct and operate its own water-works, but preliminary to this some special legislation by the general assembly is required before the scheme can be consummated. With this view, the legislative council recently appointed a committee of ten prominent citizens, identified with the interest of Memphis and interested in its welfare, to consider and report on all points involved looking to the improvement of the public water-supply. This committee, through one of its members, Gen. Colton Greene, has submitted a very exhaustive preliminary report to the legislative council. For

<sup>1</sup> For interesting report on the water-supply of Memphis at the time of the sanitary survey of the National Board of Health in 1879-'80, see report of Dr. Charles Smart, U. S. A., in Supplement No. 3, National Bulletin of Health, vol. 1, with current number for March 6, 1880.

<sup>2</sup> See report of the chief engineer, Chas. Hermany, to the "Water Works and Sewerage Commission upon a Public Water Supply and Sewerage System for the City of Memphis," a pamphlet of 127 pages.

<sup>3</sup> See "Third Annual Report of Board of Health, City of Memphis, for 1881."



interesting information on this subject, reference is made to this report, a pamphlet of seventy-two pages.

#### QUARANTINE AND INSPECTION SERVICE.

Though a quarantine station was first established in 1874, eight miles below the city, on President's island, it was not used until the summer of 1878. That year it was opened too late to be of any advantage, and was abandoned when yellow fever became general in the city. In 1874 no quarantine was opened, as no yellow fever was known to be south of Memphis before it was recognized there. In 1880 the National Board of Health was called on by the authorities in Memphis to establish a quarantine and institute an inspection service for steamboats and railroads, taking New Orleans as the initial point. It was apparent from the official records that yellow fever had prevailed in New Orleans every summer to a greater or less extent for a number of years prior to this,<sup>1</sup> and that in a community which had become so habituated to its presence it did not excite that apprehension which it would under other circumstances. It was therefore reasonable to suppose that cases might occur there which did not come under the observation of the health authorities, especially if no death was reported from the disease. But with Memphis it was different;—in view of its past few years' experience, the whole community, not only of the city but of the adjacent country, had become morbidly apprehensive, and these precautions, after the advent of warm weather, were deemed not only necessary to guard against any real danger, but for its moral influence in allaying this sensitive feeling, and to give a confidence which otherwise would not exist. This service was maintained through the summers of 1880, '81, '82, '83. It created some ill feeling and acrimonious correspondence, but was of great benefit to the whole valley country. In 1884 a change in the administration of the public health affairs of New Orleans, and improved methods in their quarantine arrangements, rendered it no longer necessary, as a confidence was then established through the lower Mississippi valley which previously did not exist.<sup>2</sup>

#### DEATH-RATE OF MEMPHIS.

The best evidence of an improved sanitary condition of a place which has had a high annual death-rate, and been the subject of epidemic diseases, is freedom from epidemics and a comparatively low death-rate.

The following table, covering a period of eleven years,—five years prior to the sanitary reformation and six years since, that is, from 1875 to 1886,—shows a decided improvement in the death-rate, due to sanitary work and the enforcement of the health ordinances.

<sup>1</sup> For essay on this subject, entitled "Memphis Sanitation and Quarantine," see Vol. VI, Reports and Papers of this Association.

<sup>2</sup> For report of this inspection service, see Reports of National Board of Health.

Assuming the population for the first five years to be 35,000, the average death-rate for the three non-epidemic years was thirty-five per thousand.

For the past five years the population has steadily increased, and is now estimated at 62,335, one third colored. The total deaths for 1885 were 1,484—white 666, colored 818. The death-rate per one thousand upon this estimated population is 23.80. (See Seventh Annual Report of Board of Health for 1885.)

Though the colored population is about one third less than the white, it furnishes the majority of the deaths.<sup>1</sup>

The average death rate for the past three years, 1883, '84, '85, is 24.40 per one thousand, a gain of about ten per cent.

TABLE OF MORTALITY FOR ELEVEN YEARS, FROM 1875 TO 1885, INCLUSIVE.

DISEASES.	1875	1876	1877	1878 *	1879 *	1880	1881	1882	1883	1884	1885	Total
Malarial fever . . . . .	131	128	148	135	79	41	43	55	88	100	83	1031
Typhoid fever . . . . .	19	8	14	10	7	17	17	11	24	38	29	194
Cerebro spinal fever . . . .	16	14	17	18	1	14	17	21	30	27	24	199
Yellow fever . . . . .	—	—	—	2779	497	—	—	—	—	—	—	3276
Erysipelas . . . . .	6	1	6	1	12	3	9	6	3	3	5	55
Dysentery . . . . .	66	79	63	30	25	45	77	29	42	54	44	554
Diarrhœa . . . . .	30	67	61	46	36	49	68	49	52	95	60	613
Cholera infantum . . . . .	52	21	31	19	32	11	19	19	27	14	28	273
Scarlatina . . . . .	1	49	17	1	—	13	2	—	2	7	1	93
Diphtheria . . . . .	5	8	13	11	1	5	37	9	7	15	7	118
Croup . . . . .	13	4	5	6	11	7	11	7	6	9	7	86
Small-pox . . . . .	8	—	—	—	—	—	—	30	—	—	—	38
Measles . . . . .	—	13	2	35	—	7	7	—	5	23	1	93
Whooping cough . . . . .	25	7	1	20	1	14	11	17	16	3	—	115
Pneumonia . . . . .	88	87	108	83	136	89	79	54	108	135	124	1091
Phthisis . . . . .	172	159	180	176	143	155	171	107	206	223	225	1917
All other diseases of lungs	18	25	28	34	10	15	41	36	42	43	37	329
Puerperal diseases . . . .	17	6	17	14	21	8	8	1	4	5	4	105
All other causes . . . . .	507	352	543	589	556	561	854	668	741	883	805	7059
	1174	1028	1254	14007	1568	1054	1471	1119	1403	1677	1484	17239

<sup>1</sup> For negro mortality of Memphis, see essay, Vol. VIII, Reports and Papers of this Association.

\* Epidemic years.

## XII.

### DESTRUCTION OF NIGHT-SOIL AND GARBAGE BY FIRE.

BY DR. GEORGE BAIRD,

*Wheeling, W. Va.*

To provide an efficient way of disposing of the night-soil and garbage of cities and towns has been a subject of much thought on the part of sanitarians for many years. Convinced that *special* contagious and infectious diseases are propagated, and that many diseases are disseminated, by pollution of the air and drinking-water, their energies have been directed to the providing of a plan for thoroughly protecting cities from the dangers resulting therefrom. With others our health authorities for several years have been trying to devise a plan for so disposing of these substances as to protect our own people, as well as the citizens of Bellaire, Ohio.

To make this understood, and at the same time furnish an example of the folly of claiming, as some do, that a running stream of water will purify itself in a few score feet, let us here give the relative situation of the two cities.

Wheeling is located on a narrow plain on the east side of the Ohio river in West Virginia. This plain is bounded on the east by high hills, and on the west by the river. The city extends along the river for five miles. Opposite the extreme southern limit of Wheeling, on the west side of the river, is the northern limit of Bellaire, and that city extends for two miles down the river. About one half mile from the north end of Bellaire her water-works are located on the river bank, and the supply-pipe extends out into the river one hundred feet from the shore at low-water mark. The current in the river is deflected, by a bend commencing a short distance above the southern line of our city, toward the Ohio or Bellaire shore, and substances thrown into the river at 48th street (our last street south) are carried over toward the Bellaire side. Especially is this the case during low water in summer. By one of our ordinances night-soil men are required to haul all night-soil to 48th street, and, after driving as far as possible out into the river, empty the contents of their carts and barrels. The garbage collectors also empty their garbage into the river at various places along the river front. From these two practices there results that the drinking-water of Bellaire is abominably polluted, and that city is made a hotbed of disease. In fact, she has the reputation of being the most unhealthy place in eastern Ohio. For how much of this our city is responsible it is fearful to



think ; but that a great part of it is due to our way of disposing of the city's refuse matters there can be no doubt.

The furnishing of night-soil to gardeners as a fertilizer has been tried ; also the giving of the garbage to dairymen. These plans have resulted in polluted wells and diseased cows. The loading of boats and towing them down below Bellaire has been suggested, and created so great dissatisfaction in other towns situated further down the river that it had to be abandoned. Determined to relieve our own city of some of the causes of preventable diseases which were too prevalent among our people, and at the same time relieve her of the injustice she was almost daily doing to her neighbor below, our health department last spring made a series of experiments in the destruction of night-soil and garbage by fire, and we claim that at last we have secured a means of entirely destroying these substances and their power to do evil. The experiments had to be made between late bed-time and morning, as a great prejudice existed in the people's minds to having night-soil burned near their residences.

Two facts about the burning of night-soil specially impressed us :— One was, the odor was not such a one as we all thought it would be ; it was something akin to the smell of burnt leather. Another was, the intense heat required to burn it.

The first experiments were made in a bench of five retorts at our city gas-works. The night-soil was mixed with fifty per cent. of fine slack, and three retorts charged with this mixture. The other two retorts were charged with a mixture of equal parts of night-soil and "breeze" (fine coke siftings). The reason for adding these substances was to divide the night-soil, and provide an inflammable substance within its mass to assist in burning it. The retorts were charged at 11 P. M., and it was not until 7 o'clock next morning that the contents were reduced to a fine, odorless powder. On another occasion three retorts were charged with a mixture of twenty per cent. of fine coke and eighty per cent. of night-soil, and two with night-soil alone. The result was the same as before with the mixed charge. Nine hours were required to burn the unmixed.

Convinced that the retorts were not the proper things for successful combustion of this substance, owing to the want of a free supply of oxygen, it was determined to find a furnace with a strong draught, capable of producing a greater heat than could be obtained in the retorts. Fortunately a change made shortly before this time in the process of making nails in our mills provided what was desired. The change from the iron to the steel nail had dispensed with the boiling furnace, and on application being made to Mr. Riester, manager of one of our iron-mills, for the use of one of these furnaces, the privilege was cheerfully granted, and by his order it was prepared for the third experiment. After twenty-four hours' heating, a charge of twenty per cent. fine slack and eighty per cent. night-soil was made, and it was burned in one hour and twenty minutes. A second charge of "breeze" and night-soil was made, and it

was burned in a little more than one hour. A third charge of night-soil alone was made, and it was burned in about the same time as the first charge.

Another change in the mills, arising from the introduction of the steel nail, was the building of the Smith gas-furnace for the heating of the steel slabs preparatory to being rolled into nail plate. This furnace is much larger than the boiling furnace, and capable of generating a more intense heat than any other furnace known. Application was made for the use of one of these furnaces, and it was kindly granted. The result of this experiment was as follows: A barrel of ordinary garbage or slop was burned in four minutes; a barrel of butchers' offal (bones and animal matter) was burned in seven minutes; a barrel of fluid night-soil, thrown into the furnace with buckets, was almost instantly evaporated; and a barrel of solid fæces was burned in fifteen minutes. Convinced that this furnace had every requisite for fulfilling the design of destroying night-soil and garbage, the committee on health reported the result of the above experiments to the council, and recommended the making of a contract with Mr. Smith for the building of a furnace capable of destroying daily sixty tons of night-soil and garbage, and also for burning dead animals of all kinds which might die within the city limits, as well as the refuse matter from our butcher-shops. This furnace is to be constructed for using natural gas as a fuel. Of its success there can be no doubt. The heating capacity of natural gas is more than four times greater than that of coal;—with coal we destroyed night-soil in a boiling furnace in one hour and a quarter; with *artificial* gas, generated from fine slack, we burned it in fifteen minutes; with natural gas we can do still better. Notwithstanding the great difficulty in destroying this substance by fire, there is in the use of natural gas as a fuel more risk of destroying the furnace than of not entirely consuming the night-soil.

It must not be understood that this furnace can only be used in cities and towns where *natural* gas has been introduced as a fuel. Mr. Smith has gas-generators built with his furnaces in cities where there is no natural gas, and claims that he can "produce a heat of greater intensity, and with more economy, than by any other method or from any other source outside of natural gas, and as cheap as natural gas can be supplied by a private company."

The fine coal, or slack, is not the only substance from which artificial gas can be generated: tanbark, peat, and many other substances can be used.

It is much regretted by us that this furnace will not be completed before the meeting of the Public Health Association in October. It would be a great satisfaction to be able to report its successful workings to that body. Mr. Smith's faith in its success is so strong that he has agreed with our city to ask no compensation until by a series of successful experiments he has shown its capacity to destroy all substances proper to be offered as tests of its powers. Should any member of the Public

Health Association feel sufficient interest in the subject of the destruction of city refuse by fire as to wish to obtain more information in reference to the Smith furnace, if he will address M. V. Smith, M. E., Bissell's block, Pittsburgh, Penn., he will be furnished full details. Mr. Smith being the inventor and patentee of the furnace, we do not feel at liberty to attempt a description of it, and have only tried to furnish proof of its capacity to solve a long tried problem in the government of our cities and large towns.



### XIII.

## OUR INLAND LAKES AND RIVERS, THE DISPOSAL OF SEWAGE, AND THE SPREAD OF INFECTIOUS DISEASES.

By EDWARD PLAYTER, M. D.,

*Ottawa, Canada.*

A large proportion of the disease to which the highly organized yet frail units of humanity are almost universally subject is caused by the waste products of human life, frequently associated with specific organic substances, which are thrown off from the body by the excretory organs, finding their way back into the body again, and most commonly along with the air and the water consumed. As a common example, I may mention the effects of rebreathing again and again the overbreathed air of unventilated rooms, and of breathing air and drinking water contaminated by sewage, or, what is the same thing, the contents of out-closets. A more notable example is found in the spread of infectious disease; for, whatever the nature of the specific infections,—and few, probably, if any, in this assembly doubt that these are microscopic organisms of the lowest type, particulate, living, and reproductive,—they are for the most part, as it were from the beginning, intimately associated with, and are practically inseparable from, the excreta of the human body, either of the lungs, or of the skin, or of the bowels, or, it may be, of the kidneys, while they are also disseminated and communicated apparently in close connection with these waste products of life; and the vehicle for conveying the waste products with the infections from one to another—from the sick to the well—is most commonly either air or water. Indeed, so intimately associated are these specific infections with the excreta, that it appears probable it may yet be demonstrated that this entire class of organisms, either within the human body or outside of it, live, grow, and multiply in their highest degree of development, in, or in connection with, perhaps feeding upon, these used up, dead, decomposing waste substances.

It is probable that in no other field can this Association, collectively or individually, accomplish more in the way of preventive medicine than in that of efforts in preventing outbreaks and the spread of infectious epidemic diseases.

Pure air and pure water bring, too, the first essentials of health. One of the most important questions which concern this Association and the public is that of the proper disposal of all the waste products of life,—the cast-off excrete substances of the human body in particular,—in order

that they shall not contaminate the air and the water which mankind are to breathe and to drink.

In the less dense medium, air, with its abundance of free oxygen, which in one form or another, perhaps as ozone, is probably the best of all disinfectants or destructors of diffused disease germs, waste organic substances of all sorts are soon transformed into simple compounds, and their products rendered comparatively harmless by rapid dilution and diffusion; and even when these are associated with living specific infections, these, too, are doubtless for the most part rapidly diffused, oxidized, and destroyed. In the heavier medium, water, however, these excrete substances are much less readily diffused, oxidized, and rendered innocuous; and it is probable that the infective organisms find water a more favorable medium than air for development and multiplication. We are all familiar with the convincing evidence which has accumulated to prove that water is a common vehicle for the dissemination of enteric or typhoid fever and cholera; and it may be, as well as milk, a vehicle for communicating scarlet fever and diphtheria, and possibly many other, if not all, of the infectious febrile diseases.

It seems clear that the spores of some moulds or mildews, which it appears belong to the same class of organisms as the specific infections of disease, will not only sustain themselves when immersed in water containing nitrogenous matter, but, owing to the facility with which they accommodate themselves to this medium, they will in it multiply rapidly. Although the pathogenic micro-organisms, which are regarded as the germs of infectious diseases, are not to be found in ordinary water, the wonderful power of adaptation to a particular medium which all such low forms of life possess is well known, and they appear to be subject to the same influences as the non-pathogenic organisms. Recent investigations by various medical scientists into the bacteriology of water have brought out some very interesting and important facts in connection with this subject. It appears from Dr. Percy Frankland's experiments, referred to in late numbers of the *British Medical Journal*, that Koch's "comma bacillus" (of cholera) is capable of adapting itself to the aqueous medium. Dr. Frankland states that "when introduced into water a large proportion of these bacilli are generally destroyed, but the remaining ones then undergo multiplication; and Dr. Wolffhügel has found that when these adapted organisms are further transplanted into fresh water, they do not undergo this preliminary reduction in their number, but commence multiplication at once." Although the comma bacillus may only survive a few days in good potable water, we are told that in London sewage it appeared to find an excellent culture medium, and was found in largely multiplied numbers after twenty-nine days. Dr. Meade Bolton has shown that the spores of anthrax remained alive in distilled water for upwards of ninety days, and in polluted well water for nearly a year, although the bacilli alone, when introduced into some kinds of ordinary water, perished in the course of a few days. Thus the spores, just as in the case of their resistance to heat and other disinfect-

ants, exhibit a vitality far greater than that possessed by the bacilli. Dr. Wolffhügel found that in polluted river water in Berlin, even when diluted tenfold with distilled water, the anthrax bacilli undergo extensive multiplication. The bacillus pyocyaneus, which produces the greenish-blue coloring matter frequently present in abscesses, after having been fifty-three days in distilled water, was found to have increased in numbers many fold those originally introduced. Dr. Arthur Downes, in a communication to the above named journal, quoting from a memoir from Professor Duclaux, states that in sixty-five flasks of M. Pasteur's earlier researches, examined by Duclaux, one hyphomycetes (*Aspergillus niger*), one micrococcus, and four species of bacillus, had retained their vitality for twenty-five years. Dr. Downes has given reasons for thinking that micro-organisms endure injurious influences, such as sunlight, better in water than in nutrient media, for the simple reason that they are in water unable to enter upon the vegetative phases of their existence. This, he writes, is in accordance with classical observations made by Professor Tyndall on the sterilization of hay-infusion.

These results, says the *British Medical Journal*, "clearly show how zymotic diseases may be communicated by potable water of even the best quality, more especially if the micro-organisms which are the cause of the disease are capable of forming spores, but even in the absence of such spores. This power of adaptation to a particular medium greatly extends the possibilities of vital activity for organisms which are not known to produce spores."

With these facts and possibilities before us, and before us, too, the probability that the bacillus entericus (of typhoid), the bacillus tuberculosis (of consumption), the micrococcus of diphtheria, and possibly the specific organisms of other infectious diseases not yet recognized, have similar characteristics, and the fact that the sewage of any town or city may contain myriads of these organisms, with the excreta from individuals suffering from the infectious diseases indicated, it is very easy to understand that to prevent the contamination by sewage of all water-supplies is of very great consequence.

We are favored on this continent with great lakes and vast networks of branching rivers of pure, fresh water, or of water which ought to be pure, but is not so pure as it once was. If properly cared for, these lakes and rivers will remain a standing and entailed inheritance of inestimable value for our descendants for yet unthought-of generations. Are they properly cared for? What do we find? Large streams and lakes and small streams and lakes alike, everywhere being polluted with the sewage of hundreds and thousands of hundreds of people,—of people who seemingly have no thought, no care for the water, no pity, no fellow-feeling for their fellow-creatures "down the stream." The people of a town or city exercise some care that their own water-supply is taken from a point above where they empty their own sewage, but give little heed to the diluted sewage flowing down to them from those "up the stream." The stream, or it may be only the current of a lake, washes



away the sewage of their own city: let the cities "down the stream" look out for themselves, is their practice. But their trouble is, the cities up the stream act in like manner, and they too must use impure, dangerous water. We are constantly reminded of Coleridge's suggestive lines,—

"The river Rhine, it is well known,  
Doth wash your city of Cologne;  
But tell me, nymphs! what power divine  
Shall henceforth wash the river Rhine!"

Let us make a mathematical calculation. I need not say, gentlemen, this is not a pleasing subject to handle or discuss; but, as medical practitioners, we have often to handle unpleasant subjects,—sometimes very young and very tiny ones. Be assured I am not speaking in the interests of the Queen's nor of the Rossin, and in order to destroy your appetite for your meals. I think we are for the most part too familiar with such undainty subjects to permit them to interfere with the few enjoyments of life which fall to our lot. We are in this city on the border of a lake having a superficial area of about 7,000 square miles. Surrounding this lake—between Hamilton at its head, on the one hand, along its northern shore to Kingston, and on the other, along its southern shore, to Water-down—there are not less than half a million of people who pour their sewage almost directly and undiluted into its waters. In other words, into every square mile of this charming body of water, which ought to be all delightfully pure, there are about sixty-five persons daily and constantly pouring all the washings of their baths, of their laundries and their sinks,—of their skin, of their underclothing, and of their kitchen utensils,—along with all their other bodily excreta and refuse; sixty-five persons to every square mile, one to every 200 square yards. Given, a lake with an area of one square mile, with a depth even as great as that of the average of Lake Ontario, and beside it a hamlet with a population of sixty-five persons who daily throw all their washings, refuse, and excrement into the lake, the water of the lake being changed only once a week: is there one of us here who would willingly use habitually for drinking purposes this water, even after "filtering" it, or such attempts at filtering as public water-supplies usually receive? This is taking a purely æsthetical view of the subject, aside from the probability or possibility of the water containing, floating about, as it were seeking a favorable spot for reproduction, the germs of specific disease, the bacillus of typhoid, or the micrococcus of diphtheria.

The water in the lake beside us, moreover, is not often changed. The currents in it move slowly; and were they to move directly towards the sea at the rate of one mile an hour, the whole of the water would only be renewed about once a week. Hence there is doubtless in the lake constantly at least a week's accumulation of the sewage of half a million of people; and every square mile of it contains the week's accumulation of sixty-five persons. But it must be observed that around the borders of the lake, where the sewers empty their contents into it, there must be

in the water a much larger proportion of sewage on the average than this, or than there is in the more central parts of the lake. Again: The water of the lake when changed is replaced by water flowing from Lake Erie, which in the lake must be in a greater degree of pollution than is this of Ontario; for although a larger lake, a much larger number of people pour their sewage into Lake Erie. The same may be said of Lake Huron and of Lake Michigan. Into these two flow the sewage of the greater part of the state of Michigan, of a part of Indiana, of Illinois, including Chicago with its more than half a million of people, and much of Wisconsin, with many towns in western Ontario. Into the great rivers, too, the waters of which, it is true, are moved and renewed much more rapidly,—the Missouri, the Mississippi, the Arkansas, the Ohio, with all their branches, great and small; into the Susquehanna, the Delaware, the Hudson, and the historic Potomac; into the Connecticut, the Merrimack, the Kennebec, the Penobscot, the St. Croix, the St. John, and the famous St. Lawrence,—flow, day in and day out, the sewage of many intervening millions of people.

I need not dwell at all here on the general nature of sewage more than to draw attention to the fact that it is all liable to contain, and frequently does contain, the germs of specific disease. Sanitation has not yet made such progress as to secure the disinfection and destruction at the bedside, and before it passes into the sewers, of all infected excreta. The sewage of every town or city will be found to contain, from time to time, or almost constantly, the excremental matter of patients suffering from one or other of the infectious diseases—typhoid, diphtheria, scarlet fever, and the like.

What becomes of the sewage in the water? All the liquid part is of course at once diluted, and in a degree great or small according to the quantity of water into which it flows, and the rapidity of movement of the water; while the solid substances gradually subside and raise the bed or bottom of the lake or stream and silt or obstruct their currents. As regards the changes which the ordinary or non-specific organic matter of sewage undergoes on being largely diluted with water, there appears to be a difference of opinion. It is generally believed that it is soon oxidized and rendered innoxious. Doubtless much depends on the nature of the organic constituents. According to the experiments of Frankland, in a report of the commissioners appointed to inquire into the pollution of rivers, in 1870, the water in the river Irwell, which receives the sewage of Manchester, after a flow of eleven miles and falling over six weirs, showed but little improvement. Dr. Letheby, on the other hand, in a report of the East London Water Bill Committee, 1867, considers that purification takes place more rapidly, and that if sewage is mixed with twenty times its bulk of water and flows a distance of nine miles, it will be completely oxidized. This could only be the case, plainly, with the more soluble substances. Dr. Letheby doubtless did not mean to include living specific micro-organisms, which were at that time hardly recognized. Parkes states,—“Average Lon-

don sewage, diluted with nine parts of water and syphoned from one vessel into another so as to represent a flow of ninety-six and one hundred and ninety-two miles, gave a percentage reduction in the organic nitrogen of 28.4 and 33.3 respectively." He found unchanged epithelium in unfiltered Thames water after a transit of eighty-six miles in a barrel, and after being kept five months. He says plainly, "In inland towns, sewage cannot be discharged into rivers."

Indeed, what has been said by those authorities in relation to sewage must all be regarded as applying only to dead matter—to used up, waste organic substances, largely diluted with water. At those times, and until very recently, there was no known means by which the specific infections of disease in water could be detected; and water that was then considered chemically pure and potable may have contained, and doubtless often did contain, the germs of infectious disease quite unknown to the chemical analyst. Within the last year or two the microscope, with culture fluids and gelatine plate cultivation, has revealed the defects of chemical analysis in deciding upon the purity or non-purity of water.

What had been previously above stated in relation to the vitality in water of the different forms of infectious organisms, and more especially of their spores, indicates the danger to which the public are exposed in drawing their water-supply from any body of water into which ordinary sewage is largely or indiscriminately poured. Reasoning from analogy, we are led to believe that such water, although showing upon chemical analysis but a trace of organic matter, and regarded as a pure potable water, may yet contain the specific infectious particles, which when taken into the human body, when this is in a state of receptivity, are capable of giving rise in such body to the specific disease of which the infectious particles are the seeds. If the bacillus of Asiatic cholera and the spores of the bacillus of anthrax will continue to live in water for weeks and months, and there multiply, as the cholera bacillus has been shown to do by Dr. Wolfhügel, why may not the specific organisms (or their germs, or spores if they are sporing bodies) of enteric or typhoid fever, or of other infectious diseases, or certain of them—the fittest, the adapted ones—likewise continue to live for weeks and months and to multiply? And, furthermore, when they are cast in countless numbers along with sewage into a body of water even as vast as one of our large lakes or rivers, may not certain of them be wafted by the water currents hither and thither and into some public water-supply, and so eventually be swallowed by some receptive but unsuspecting human being, and finding there a suitable soil, develop and multiply and give rise to the special specific disease of which they are the specific infections?—just as we know the seeds of higher organisms—as the weeds of the field—are wafted by the wind to other, new, and distant fields, where they take root, and live, develop, and multiply. I say, may not this be the case? Is it not quite within the range of possibilities? Is it not possible that in this way may be explained the source or origin of cer-



tain outbreaks of infectious disease, which otherwise baffle investigation and defy explanation?

There is no lack of evidence to prove, as clearly as any circumstantial evidence can prove anything, that serious outbreaks of infectious disease, such as enteric fever, have resulted from the contamination of a public water-supply by the dejecta of one infected person suffering from the disease. If the micrococcus of diphtheria and the bacillus of enteric fever, or the specific infections of scarlet fever and measles, are as capable of adapting themselves to the aqueous medium and are as tenacious of life as the bacillus of anthrax and of Asiatic cholera,—and who can say that we have any reasons to believe they are not thus capable and tenacious?—then we must admit that the danger of contaminating the water of Lake Ontario by the dejecta of the hundreds of individuals who are from time to time or constantly suffering from one or more of the infectious diseases above named in the cities and towns which surround this lake and make it their cesspool, and the danger of contaminating the water of a small stream or reservoir of water by the dejecta of one infected person, differ only in degree. And I contend that the degree of danger in the former case is sufficiently great to demand more consideration and attention than it receives. What I have said of Ontario may be said of Lakes Erie and Huron and Michigan, and of all our rivers, both great and small.

It may be said that if what I herein contend were tenable, outbreaks of such diseases would be much more frequent than they are universal, and that the human race would soon be decimated or destroyed. This need not necessarily follow; and besides, such outbreaks are common, and in the case of most of them, or of the first infections in the outbreak, we know not whence they came.

It is not to be supposed that the micro-pathogenic organisms—these germs of specific infectious disease—are proportionately numerous in our lakes and rivers, although we may reasonably suppose that they will gradually become more and more so; or that they could be detected in every tumbler, or in every barrel or in every hundred barrels, of water. But that there is danger from at least the casual presence of them will I think be generally admitted, and that this danger will increase from year to year.

In cities and towns where the water-supply is filtered the danger is lessened. But the filtering process as most commonly practised is of little value, and gives only a false, and indeed sometimes a dangerous, security. In Toronto, for example, it has been publicly stated that little fishes—small, but very unmicroscopic and fit to fry—have on occasions found their way through the water tap into the kitchen pot. With the nature of the filtering process or of the filtering bed which permits the passage of such food along with the drinking-water I am not familiar. In London, England, the filtering of the city water-supply by the different water companies is most carefully and thoroughly done through a series of filtering beds, repeatedly changed. The monthly examinations

of the London supply, made by Dr. Percy Frankland, and published in Sir Francis Bolton's reports to the local government board, show that the river waters, in the process of storage and filtration, have the micro-organisms which they contain reduced on an average by ninety-five per cent. before reaching the consumer; and a similar reduction has been observed in the case of the public water-supply of Berlin, which is periodically examined under the superintendence of Dr. Koch.

Notwithstanding the great care exercised in those cities in the filtering process, there is still the risk of five to one hundred. Plainly, the only safe way is either to keep the sewage entirely out of the waters both of rivers and lakes, or to obtain the water-supply from great depths in the earth, such as from artesian wells. And even if the latter course be adopted, if water from great depths only be used, and the present method of sewage disposal continued, then the foul waters will contaminate the air.

It appears to me that all in this assembly of men, who take so deep an interest in the public welfare, will concede that the present method of disposing of the sewage is not the proper one, and that there should be a change. If it is continued, eventually our rivers and lakes will be but little better than sewers and cesspools. It may be said that to bring about such a condition of the waters would require such a length of time that we need not give ourselves any uneasiness about that future. But with the rate of increase of the past half century proportionately continued, what will be the condition half a century hence, or a century hence? What kind of legacy are the people of this generation preparing for their grandchildren and great-grandchildren? Look at the Toronto bay, with its "full seven and twenty stenchcs, all well defined, and several stinks," of Coleridge, and think of it clear and pure and beautiful as it was half or three quarters of a century ago, and as it ought to be now! May not the people of this fair city reasonably wish, and ardently, that their grandsires never had commenced to pour their sewage into its waters, or even into the lake? Will the bay ever again be the same as it once was? Will the soil of the beautiful country at the back of it ever recover its early richness and powers of production, and yield so abundantly of its fruits for the people as did once the virgin soil? and as it would now still do had not those fathers and grandfathers poured its yearly decreasing strength into this once beautiful lake, instead of returning, year by year, as they should have done, to mother earth, the mineral and other elements—the foundations stones, as it were—for her annual products, and at once preserved the soil and the water. Think of the grandeur of the heritage we of this generation would now possess if all the bays and streams and lakes and rivers of this continent were in a state of virgin purity; or more, even,—as, for example, with any marsh waters any of them may have long ago contained or been associated with, drained or cut off from them.

But we must not reflect on our fathers and grandfathers, grand old pioneers that they were. They did their best for us, and did very much,

and nobly. Moreover, they knew not, or hardly, what they were preparing for their descendants; knew not of the mischief that follows such a method of sewage disposal as has been and is still practised. We may charitably and fairly believe that had they known of it all, they never would have commenced the practice. We know of it now. Shall we not put forth an effort to stay the tide of mischief, in order that our grandchildren may not inherit from us a still more undesirable inheritance than we have come into possession of?

A great deal could be said, and perhaps profitably, of the serious consequences (serious in view of the future food-supply) of yearly depleting the soil as we are now depleting it, but it is not quite within the province of this paper for me to do so. I would, however, in but a few words, simply allude to, or name for future reflection, two or three points.

The Israelites, when Jerusalem was a large and prosperous city, provided large and costly aqueducts, still extant, which supplied abundance of water, with which they flushed their sewers and conveyed their sewage to large tanks, whence the liquid part was drawn to be used for irrigation, and the solid sediment employed to fertilize in another form.

The great fertility of China has been largely attributed to the care with which the inhabitants return to the soil that which they have taken from it.

One of the principles of national economy laid down by Prof. Thudichum is that the capacity to produce food must be rendered permanent by a strict observance of the laws of nature regulating vegetable life, the knowledge of which is the basis of agricultural science. And the first and most important of these laws is, that we must return to the soil the mineral ingredients we take from it in gathering our crops.

F. C. Krepp, in his work on sewage, refers to the high value of the waste products of the human body, which it appears afford certain materials, gases, &c., for the growth of vegetation not provided by any other fertilizer. The best authorities estimate that the waste products of every individual will, if returned to the soil, give an increased annual yield of crops worth £1 sterling. At this rate the sewage on this continent would be worth every year \$250,000,000. Notwithstanding the use of guano and other fertilizers, the sources of which are becoming exhausted, the soil is almost everywhere diminishing in fertility, and no longer yields the amount of produce it once did.

Gentlemen, we of this generation are making drafts upon the future—drafts upon our children and grandchildren—drafts to be paid in their health and life and happiness, in which we are little short of criminal. Many of you here who have come long distances to take part in the efforts here being made to promote the well-being of the people, would, I am sure, gladly do much to produce an entire change in the present method of disposal of the waste products of life. Probably there is not a man here who, after the manner of Canute, if he thought he could but accomplish the good intent of the purpose, would not go down to the



water's edge and stay the tremendous tide of sewage now flowing into the lakes and rivers of this continent, and turn it back into the soil. The tide of this sewage has a different source from the tide of the ocean; and it could be turned back, and by human effort. The right sort of effort need not result in such failure as did the ssembled effort of the Danish king. But doubtless it would or will take a long time to turn it—to persuade or compel all the people in all the towns and cities on this continent to return their waste products to the soil. However long the time, it must have a beginning. I appeal to the members of this Association to favor and move for a beginning at this meeting. Let us appoint a special committee to consider, and report upon at a future meeting, the best way in which the great masses of the people can be led to see the advantages of making such a change in the present usual method of disposal of the waste products of life as shall best preserve their great mother, the soil, and their greater and older mother, the water.

## XIV.

### DECOMPOSITION OF ALBUMINOID SUBSTANCES, AND SOME SANITARY PROBLEMS CONNECTED THERE- WITH.

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My chief object in preparing a paper on this subject has been to endeavor to present some of the broad facts relating to the almost endless conditions under which the putrefaction of albuminoid substances occurs, with the hope that it may aid us to appreciate more clearly the principles which underlie all methods tending to lessen or remove the dangers to life which are everywhere admitted to be associated with the process.

No lengthened argument is needed in pointing out that organized beings are but portions of the cycle to which all things mundane belong; that organization has—speaking within not too narrow limits—its counterpart in disorganization; that the complex is unceasingly being disintegrated into the simple, and as constantly being evolved from it; and that man, even, Nature's

“ — last work, who seemed so fair,  
Such splendid purpose in his eyes,”

shall ever and inexorably

“ Be blown about the desert dust,  
Or seal'd within the iron hills.”

Starting, then, from this scientific truism, it becomes of some interest to examine the problem of the reduction of complex, organized, nitrogenous matter to its simpler component parts; or, if you prefer it, the problem of its organic analysis.

Not many years ago the reduction of albuminoid compounds was considered a purely chemical process, and as recently as 1883 the late Prof. Angus Smith believed that the oxidizing or chemical process had a distinct place alongside of putrefaction or the biological process in “destroying organic bodies at ordinary temperatures.” Writing in the same year, Prof. Burdon Sanderson, F. R. S., says,—“According to the doctrine set forth by Pasteur in 1862, and now generally accepted by biologists and chemists, putrefaction, in common with other fermentative processes, is identified with the life of the organisms, which observation shows to be its constant concomitants.” He nevertheless adds,—“The process remains as it was before, a chemical one. . . . Thus bacterial life is a middle term between chemical antecedents and conse-

quents." From such statements we conclude that putrefaction being predicated, we always have organic matter, bacteria, and certain chemical compounds other than the original nitrogenous compounds. It becomes at once evident that we have three distinct parts of the problem presented for our consideration,—

(a) Organic matter (albuminoid), dead matter.

(b) Bacteria (albuminoid), living matter.

(c) Chemical compounds (simpler), both organic and inorganic.

From the practical sanitary standpoint it will be our duty to endeavor to determine just what amount of value each of these factors has as an element in the causation or the prevention of disease.

(a) Organic matter (albuminoid), dead matter. As well expressed by Adolphe Strecher, "proteine substances are widely disseminated in the animal and vegetable kingdoms; they are the compounds taking the principal part in the physiological changes occurring in the organism." Hence we have so-called gelatines, chondrin, albuminoid substances, including the alkaline albuminates and the acid albumins, globulins, hæmoglobin, albuminoid ferments, &c. I have here used the term *dead albuminoid* matter only for the sake of clearness, since in a biological sense we cannot deny that, as formative parts of living organisms, the elaboration and multiplication of their kind is a quality of nearly all, if not all, of these tissues. For our present purpose I intend, however, to consider them all, in their dead form, as portions of muscle, tendon, blood, milk, excreta, dead vegetable matter, &c., &c.

Referring to all these compounds as they come into the hands of a chemist, we find that they are composed of C, H, N, S, O, combined in most complex manner with a very high number of atoms of each to the molecule, that they show numerous reactions with reagents, that from them can be obtained different substances, as leucin, tyrosin, aspartic acid, &c., and, finally, that all of them when moist putrefy, readily yielding numerous substances, as  $H_2S$ ,  $CO_2$ ,  $NH_3$ , trimethylamine, ethyl-amine, and various combinations of the fatty acids.

It is abundantly apparent, then, that dead albuminoid matter, *per se*, must become a something of enormous importance, since, using the hackneyed phrase *ex nihilo nihil fit*, we may say that, assuming that the bacteria of putrefaction can live and have their being only in such substances, their absence determines the non-existence and non-propagation of saprophytes of every kind.

In these days of progressive bacteriology, I have sometimes thought that we are apt to lose sight, in some measure, of the part which dead albuminoid matter, *per se*, probably plays in the causation of disease. To illustrate, we know that in the atmosphere in certain places may be found innumerable dried particles, as of epidermis, fragments of animal and vegetable fibre, and that what Beale calls degraded bioplasm exists abundantly as granulation tissue, pus cells, &c., both within and without the system in abnormal conditions. Further, we do know that abnormal products of normal tissues, as cancer cells, may be developed



within the body, and that the ordinary excretions may be retained within the body to the point of creating disease. Remembering all this, we cannot fail to see that particles, infinite in number, of dried, non-putrefied dead matter from the surface of our streets, from our cattle-yards, slaughter-houses, and butcher-shops, from the walls and floors of kitchens, cellars, &c., of wool, leather, cotton, flax, &c., &c., are constantly being inhaled by our lungs, and, adhering to food, in water, milk, &c., are inevitably received into the stomach. Recognizing the fact of the innumerable particles which are thus taken into the system, we have to conclude that they are disposed of either by being digested and absorbed, by passing into the blood unchanged through abraded mucous membranes, or by being excreted. Should they pass into the blood, it would seem that they may either be assimilated, produce through their developmental or physiological processes abnormal states of health, or be thrown off by the emunctories. That such possible accidents are not alone theoretical may be gathered from the fact that sewage and vegetable matter, present in potable waters in winter, when they are frozen over, often become the cause of blood-poisoning or diarrhœa (sepsis), not from their being in a state of putrefaction, but because of their subsequent fermentation in the alimentary canal with consequent intestinal irritation, or by the germs of special diseases, which, finding in the body favorable conditions for development, are absorbed into the blood, setting up some form of septicæmia.

(b) Bacteria (albuminoid), living organic matter. It has already been remarked "that putrefaction is identified with the life of the organisms which observation shows to be its constant concomitants." These organisms, now almost universally recognized as vegetable, do not seem to differ greatly either in form or in method of development from the germinal matter of animal tissues. Micrococci of various forms are, for instance, indistinguishable in form from various tissue cells of the animal body, while spores of different bacilli are in many instances not to be differentiated the one from the other. It would, however, be as presumptuous as it is unnecessary for me to attempt, in order to the development of our subject, to describe the various species of bacteria and their functions. Suffice it to know, that all modern teaching goes to show that they condition putrefaction, and that during this process they multiply with enormous rapidity, feeding upon albuminoid matter, and by physiological processes produce within themselves certain definite chemical compounds similar to those mentioned already as being present, and associated with others which, of recent years, have been shown to be of very great importance, since those, as phenylacetic and phenylpropionic acids, have been shown to be capable of limiting the growth of bacteria in solutions, both during the natural processes of putrefaction and when artificially added to cultures. In other words, it has been proved that bacteria are self-limiting when developing in culture solutions, and that a new factor in the progress of infectious diseases has been elucidated. Another point of importance in the life-history of

bacteria is the influence of free air, or, in other words, of oxygen. It is best illustrated in the well known history of the development of the yeast-plant. A solution of malt, or wort, being given, the free development of the yeast-plant is related directly to the amount of oxygen present. Abundance of oxygen means great development of yeast-cells, with but little alcohol; while but little air means much development of yeast, but a much greater production of alcohol. The secondary products in such solutions, which now become chief factors in bacterial development, are of equal interest and importance, since they illustrate how other forms, as *mycoderma vini* and *mycoderma aceti*, ever present awaiting conditions favorable for their multiplication, develop in the now altered cultures, taking the place of the previous microbes in the solution, and how, finally, its reduction to gaseous products may be completely effected through anaerobies or airless organisms, as *penicillium*, in the deeper portions of the fluid.

From these now well established facts analogy points to what are daily being illustrated, viz., that processes similar in their nature and results are going on in albuminoid matters, by which, according to the abundance of oxygen present, one class of bacteria feed upon such materials, producing simpler products, this species being again succeeded by another, until the never-ceasing process of reduction to simpler and gaseous compounds is completed. The infinite variety of bacteria, conditions of development, and results are nowhere, that I am aware of, more beautifully set forth than in Duclaux's explanation of the digestive process in the stomach of a child. As will be remembered, pancreatic juice contains an unformed ferment which liquefies nitrogenous materials as well as hydrocarbons. Duclaux informs us that in the stomach of young animals exists a peculiar ferment known as rennet, which coagulates caseine, and which, further, secretes a diastase or enzyme similar to that of the pancreatic juice. This diastase performs on the food of the child a digestion similar to that of the pancreatic juice in adult animals.

Referring in more detail to the decomposition of albuminoid substances, it is now well known that the process begins by their transformation, first, into albuminates, or substances soluble both in acids and alkalies, but precipitated in neutral solutions; and, secondly, by their further change into *peptones*, or substances soluble in acids, alkalies, or in neutral solutions, and at all temperatures. The second stage in the process is the further reduction of these into simpler products, the principal of which are leucine, tyrosin, and indol. The process, as is evident to all, and as stated by Prof. Burdon Sanderson, has "an obvious resemblance to the changes in materials in the animal body, the differences being chiefly in the intermediate stage. \* \* \* It is alike characteristic of both, that organic acids belonging to the acetic series, *i. e.*, having the constitution  $H(CH_2)_n$ ,  $CO$ ,  $OH$ , are produced in such quantity as to represent a large proportion of the initial material. In the metabolism of the higher animals these occur as glycerides of the higher fatty acids, in the bacterial process in the form of compounds of the alkali metals or

ammonium compounds of acids of the same series in the constitution of which ( $n$ ) has a lower value. The analogy, which has just been referred to, derives its importance from the consideration that in the production of all infectious diseases, from inflammation to the specific infections, the two processes are concomitant and at the same time antagonistic.

“From this very general statement it is obvious that bacterial life, regarded from a chemical point of view, that is to say, with reference to the question of the initial (proteid) material and the end products ( $\text{CO}_2$ ,  $\text{H}_2\text{O}$ ,  $\text{NH}_3$ ) corresponds closely with that of animal life in general. For while bacteria feed on proteid, and convert its material into the simple forms above enumerated, the higher animal organisms in their processes of digestion and assimilation arrive eventually at the same result. The difference lies chiefly in the intermediate stages: in both, bodies belonging to the acetic acid series are produced in such quantity as to represent a large proportion of the initial: in the first, the bodies include the lower members of the fatty acid groups, whilst in the second the higher members appear as glycerides, or fats. The mode in which the presence of septic organisms in the living tissues of man and animals can be best understood is, by recognizing the essential correspondence which exists between their vital processes. It is because the vital processes of the bacterium resemble so closely those of the animal with which it associates itself that the one comes into such relation with the other as to exercise a modifying (that is to say, a disease producing) influence upon it.”

From these abstracts, and from what has been already referred to, it would seem that it has now become possible for us to understand in large measure the true relationship sustained by bacteria to the physical system of animals, and how, by their own physical processes, they exert far-reaching influences upon the health of mankind. That which they feed upon, whether external to the body, in the digestive tract in the blood and tissues, or in pathological conditions, is seen, so far as the bacteria of putrefaction are concerned, to be much the same, as well as the substances elaborated by them. The product may be phenol, tyrosin, indol, scatol, a ptomaine, sepsin, &c., &c.; but whatever be the product, according to the particular species present, definite effects cannot fail to be produced. Should the putrefactive processes go on external to the human system, then innumerable bacteria and gaseous compounds produced thereby are taken into the system. If within the digestive tract, their probable rapid development under conditions so favorable may sometimes be beneficial by disintegrating food, thereafter to be acted upon more readily by the natural digestive ferments, and sometimes injurious by producing substances counteracting the influence of the natural enzymes, or by their directly poisonous effects upon the blood. And, finally, when through whatever avenues microbes may obtain entrance to the blood, they are capable of exerting, if the normal resistance of the system to their development be weakened by whatever cause, those fatal effects common to epidemics either of past ages or the present time.



To these ubiquitous beings, by extreme metaphor, we may almost apply the laureate's words :

"Thine are these orbs of light and shade :  
Thou madest life in man and brute.  
Thou madest death : and lo, thy foot  
Is on the skull which thou hast made."

(c) Chemical products (simpler), organic and inorganic. But little in addition to the references made in the last section need be said regarding the chemical products of putrefaction. What the principal are, as well as their relationships, has been already in large measure stated ; but with regard to those volatile products which by their effect on the senses give the popular ideas of what constitutes a nuisance, a few words may be spoken. Carbonic acid, a common measure of the presence of decomposing organic matter, however serious in its individual effects in confined spaces, must be considered of most importance in the first named connection. As regards putrefaction *per se*, ammonia and its compounds must unceasingly continue to be regarded as of prime importance. Prof. Angus Smith has told us that not alone in connection with large masses of decomposing organic matter is ammonia present, but, as shown by the mustiness of rooms, it is present in places often supposedly most free from dangers of a zymotic character. Sulphuretted hydrogen, the frequent attendant of ammonia, with such allies as acrolein, must be considered of much importance by acting as danger-signals indicating the proximity of enemies still more dangerous to health.

It has, gentlemen, been my endeavor, so far, to point out the unity of the conditions under which the putrefaction of the numerous albuminoid substances occurs, as well as the close connection in its effects, and it will now be proper for us to consider the problems which, as practical sanitarians, we have daily presented for our consideration. The task is to some extent appreciated when the universal presence of such albuminoid materials is thought about for a single moment. We have time to refer to but a few of the more important practical problems which are presented for solution. The question varies somewhat as we pass from simple rural communities to densely populated cities. In the first instance we have as most prominent, how to lessen the evil influences of decomposing vegetable matter, as in swamps and new lands ; but we, nevertheless, will not fail to see that in the case of pig-pens, stables, cellars, wooden foundations, cheese factories, creameries, dairies, wells, sinks, slop-water, &c., the question is a very large one. We have, it will be noticed, a number of these likewise in cities ; but along with them are associated cattle-yards, slaughter-houses, packing-houses, knackeries, glue factories, fat-rendering establishments, soap factories, milk shops, canning establishments, artificial manure factories, breweries, distilleries, street filth, garbage, sewage, and many other sources of putrefaction.

Now, to deal with these almost innumerable conditions under which

bacteria of various forms multiply seems a problem so wide in its extent as to make its solution almost an impossibility. But however great the difficulties, and however numerous the obstacles in our path, it appears to me quite evident that all real progress will follow from our recognizing a common basis for all the evils arising from putrefaction. We will require to establish and teach individuals, the public generally, and our legislators, that a nuisance is not primarily dead organic matter, but really living organic matter, *i. e.*, microbes, or bacteria. To do this it is absolutely necessary that we teach and preach, in season and out of season, that bacteria live, move, and have their being after a manner similar to those larger living beings, even man himself, whom they can behold, and whose physiological processes they can in some degree comprehend. Every person above the status of an idiot can appreciate the fact that by the eating of food he receives nourishment, and that it is by some process within him that bone and muscle are developed, and that food is the condition of continued existence. Similarly he knows that through insect and other life dead matter is consumed, and that its destruction is coëval with their disappearance. Further, when he sees that milk, meat, and other substances, not exposed to insect life, soon become changed, that they give off disagreeable odors and become unfit for food, he cannot fail to comprehend the fact that other agencies have been producing these effects, and comparing the milk or meat, good and fresh, with the same putrid, he at once sees that it has not been these foods which are the cause of the nuisance, but that they simply condition its existence.

Those of us who are medical officers of health, and have to deal with the practical question of how to abate a nuisance, fully realize how crude as yet are the ideas of what the cause of a nuisance is, when from the judge's bench down to that of the most insignificant magistrate we find men gravely examining witness after witness, up to hundreds in number, in order to decide whether a slaughter-house, a piggery, or sewage at its outfall, actually does create a smell or not. We smile at the absurdity of any set of sane men arguing as to whether sulphuretted hydrogen does actually smell or not; and I have known of instances where sanitarians have been brought to Toronto all the way from Chicago in order that their expert noses should determine whether 5,000 cattle in a cattle-byre did or did not produce a bad odor. We must, then, it seems to me, be prepared to assert, once and for all, that, given nitrogenous organic matter, it is certainly going to putrefy somewhere, sometime, and under certain conditions of heat and moisture; that the bacteria producing this putrefaction are going, in their development, to break down organic matter into simpler forms; and that we must as positively assert that the nuisance invariably exists where bacteria exist, and that we have only the question of the degree of a nuisance to deal with. Altering the line of argument for a moment, let us consider the case of some infectious disease, as diphtheria. Two or three weeks ago I addressed a circular, with questions regarding this disease, to medical officers of health,

&c., in the province. In some 137 answers received, it appeared that during eight months 962 cases and 207 deaths had occurred in these districts heard from. In reply to the question as to what they considered the chief causes of the disease, the answers state,—impure water, wells too near privies and receiving sewage therefrom, containing dead toads, &c.; vitiated air from damp, ill-ventilated cellars, houses, and filthy surroundings; houses built too near the ground, with decaying foundations, &c., &c.

From these answers we may gather that there is a wide-spread belief that putrefying organic matter occasions diphtheria; and yet we cannot doubt that in few, if any, instances could a conviction have been obtained from a court that a nuisance had existed. We assert, then, that the septic organisms, and not the decomposing organic matter, ought to be considered as primarily the nuisance. To take but another instance, viz., that where, according to a recent local government report of Great Britain, scarlet fever was disseminated in milk from cows suffering from a disease which produced something of a rash on tender parts of the skin and ulcers on abraded portions of the teats, it seems quite apparent, according to Klein's experiments with micro-organisms taken from these ulcers, that it was not the milk *per se*, but the organisms it conveyed, and which caused the character of the milk to be altered, that were the nuisance, or real *materies morbi*.

Thus by degrees we have approached those problems which are for associations such as this to discuss and solve, and having solved them, to then agitate for legal enactments and changes in sanitary methods which make possible the putting of them into practice by executive officers of health. Leaving to others the discussion of sewage problems, water-supplies, house-drainage, &c., as being all problems directly connected with this subject, I propose to refer most briefly to two most important sources of food-supply, viz., meat and milk.

During the past year the provincial board has frequently had brought to its notice the complete absence of, or, at the best, absolutely crude, municipal regulations for protecting the public, particularly of our towns and cities, against the evils arising from diseased meat and milk. In the course of endeavors to obtain reforms in this direction, it has been my duty to examine into these matters as they exist in the United States; and I regret to have to state, that, so far as I can learn, there are very few places where there is any proper inspection of live animals before slaughtering, few *abattoirs* even in very large cities, and few, if any, places where any proper inspection of sources of milk-supply is carried on. It may be true that regulations are in force regarding adulterations, &c., but none practically exist regarding the healthfulness of the source of the milk-supply. In order to illustrate the necessity for work in this direction, I may state that I have obtained the results of answers to a circular sent out to rural municipalities in this province contiguous to cities. They, in effect, are, that in some seventy municipalities heard from there is no inspection of milk-supplies for cities; that almost no inspec-



tion, unless in case of complaint, is made of slaughter-houses, and of cheese factories and creameries; and that in the case of slaughter-house refuse it is almost invariably fed to hogs, which are sold uninspected in the neighboring markets.

In view of so grave a state of affairs as this, which I venture to state is not peculiar to this province; in presence of the fact of the prevalence of diphtheria, &c., existing in many instances where no local cause could be discovered; and in consequence of yearly increasing dangers due to the enormous development of the trade in farm animals, both continental and inter-continental, whereby tuberculosis, trichinosis, and hog cholera may be so readily disseminated, all of which bear so directly upon public health interests,—it seems to me that there is no one department of our work as sanitarians demanding more urgent attention than this.

The following, from an article on tuberculosis by Frank S. Billings, V. S., aptly states the case:

“Our milk inspection is a semi-farce. If the cows are tuberculized or otherwise diseased, if they are improperly housed or fed, what a humbug it is to watch the stream from its fountain-head to the consumer and leave the spring itself entirely out of consideration.” “The state should know the exact condition of every animal in it. By this means alone can it know how much it annually loses from this cause, and to what extent contagious or infectious diseases prevail. It cannot know what it should seek to prevent until it knows what exists, how it came to pass, and how it gets spread about.”

To what Mr. Billings has said may be added what is of even more importance, viz., that the condition of the premises where the milk is kept, and of every man, woman, and child in the houses of those who deal in it, should be known, whether on the farm or in the city. Public *abattoirs*, so situated, constructed, and conducted as not to create or perpetuate public nuisances, with good cattle-yards attached thereto, should everywhere be erected under state compulsion, and take the place of those abominations, private slaughter-houses. Inspection of every animal before slaughtering, and of the meat afterwards, should be stringently carried out, and the whole trade licensed and kept under the strictest surveillance.

In conclusion, I have only to state that in my opinion there is no subject more urgently demanding immediate, thorough, and systematic examination in all its details than this of the inspection of the sources of supply of two of the most important articles of food; and it appears to me that a special committee of the Association could, with marked benefits to the public health, employ its energies during the coming year in examining into this whole question, to report upon it, with practical conclusions, at the next annual meeting of the Association.

## XV.

### SANITATION IN STREET PAVING.

By GEORGE BAIRD, M.D.,

*Wheeling, W. Va.*

Should sanitarians be consulted by municipal authorities in reference to the material used for street paving, and the manner of laying it, to best protect the lives and health of the citizens? To this question there should be only an affirmative answer. The Macadam road, the cobble pavement, the wood pavement in its various forms, and the granite pavement, have all been found more or less objectionable from a sanitary standpoint. The Macadam, with its rapidly worn surface and its clouds of dust, carrying disease germs in them; the cobble pavement, with its noise and innumerable pockets, furnishing lodging-places for decaying animal and vegetable matter; the wooden pavement, decaying in a few years, and absorbing urine of horses and foul liquids of all kinds which were poured on its surface; and the granite, with its noise far exceeding the cobble, its slippery surface when worn, and its open crevices between the blocks, permitting liquids of all kinds to pass down and pollute the street surface beneath,—are each and all of them subject to adverse criticism.

If these statements are true, the question naturally suggests itself, Is there any material known, suitable for street-paving, free from such objections, and at the same time of such cost as to be within the reach of the great majority of cities and towns desiring to have paved streets?

It is claimed by our people that there is a material which fulfils these requirements, and that Wheeling is the city to first introduce it.

The material is the vitrified paving-block manufactured by John Porter, of New Cumberland, W. Va. This block is an oblong truncated wedge 9 inches long,  $4\frac{3}{4}$  inches wide,  $3\frac{1}{8}$  inches on one edge, and  $2\frac{1}{8}$  inches on the other. It is composed of fire-clay, iron ore, and silica, fused to a homogeneous mass. When the surface of the street is properly graded and rolled, the blocks are laid in three or more inches of sand, the broad and narrow edges turned upward in alternate rows, and the joints broken, as in first-class brickwork. The spaces between the blocks are brushed full of finely screened gravel, and paving cement is poured on this until they are made completely water-tight. Over the surface of the pavement pitch is poured, and a layer of sand one half inch is spread. The roller is then passed back and forth over the pavement until all the blocks are firmly settled in their places, and the entire surface forms a continuous uniform plane.

The advantages of this pavement are the antiseptic properties of the pitch on its surface and between the blocks, the providing a water-tight cover for the surface of the street, preventing the passage of foul liquids to the street beneath, and also furnishing the great desideratum for a good street, to wit, a dry foundation, the absence of depressions in which animal and vegetable matters can lodge and decompose, the ease and economy in cleansing it, its not absorbing urine of horses or any foul liquids, its freedom from noise, and its not being affected by frost or heat.

It also offers less resistance to the passage of heavily loaded vehicles than any other street surface except asphalt, and it has an advantage over it in its not being slippery in any weather or on any grade. The combination of pitch and sand affords a sure footing for horses at all times.

The life of the pavement is without limit. A renewal of the surface coating of pitch and sand when worn off, at a cost of one cent per square yard, will prevent all wear of the block.

The cost of this pavement is not more than cobble, much less than wood, less than one half that of asphalt, and not one third that of granite.

A pavement called the Steubenville pavement has been extensively noticed in the newspapers in the United States, and has been a good deal sought after on account of its supposed cheapness. It is made of fire-bricks of the size of an ordinary red brick, laid on their edges, in sand, and rammed or rolled. The same objections exist to this pavement as to the cobble and granite pavements. The crevices between the bricks are filled with sand (no pitch and gravel being used), through which foul liquids are liable to pass down. Wherever this occurs, the bricks not having any power of resistance to the downward pressure of loaded vehicles passing over them, on account of their sides being straight, and not bevelled as the blocks are, depressions are made in which decomposing substances lodge. These depressions also add to the noise which the unprotected street surface gives rise to. The surface being bare of pitch and sand allows the wear and tear of the brick to be much greater than if it were covered, and reduces the life of the pavement to a few years at most. For these reasons this apparently cheap pavement will prove not only a dear one, but also an unhealthful one,—dear, because it will in a few years cost as much as it did at first for repairs and relaying, and unhealthful, because there is not a single sanitary precaution taken in its construction.

A brief statement of Wheeling's experience in brick and block pavements may show why her people have such firm faith in their good qualities. A few years ago it came to the knowledge of our board of public works that street pavements composed of hard-burned *red* bricks, laid on a board foundation, had been in use in towns in France, and in one or two places in this country, for many years. Thoroughly disgusted with cobble and Macadam, having no faith in wood, too poor to attempt having asphalt or granite, and satisfied that here was a style of pavement which, if successful, would prove a blessing to our people, the board



laid a few squares of a pavement of *fire brick* on a board foundation. Each board was soaked in boiling pitch before being laid, and the bricks laid in a bed of sand spread on the boards. The crevices between the bricks, and also the surface of the pavement, were not poured with pitch until a year or more after the pavement was laid, and after experience in the *block* pavement showed the advantages of so doing. Satisfied that in a few years this board foundation would decay and become detrimental to health, the board used the vitrified block before mentioned. Two objects were especially desired to be accomplished by it. One was to do away with the board foundation, and the other was to have the blocks of such shape as to be self-sustaining and furnish crevices which would securely retain the gravel and pitch and make them thoroughly watertight.

Several of our principal streets have been paved with the blocks, and although those are the streets over which the greater part of the travel and heavy hauling of a manufacturing city of thirty-five thousand people has passed for several years, there has not yet been a dollar expended for repairs on them.

During the past season there have been ten streets paved with the fire brick without the board foundation, but with the crevices brushed full of sand, and hot pitch poured in them as well as on the street surface. This makes a much better and more healthful pavement than the Steubenville pavement, but at a somewhat greater cost. This will be offset by the longer life of the pavement and its less liability to require repairs.

It is open, however, to the objection that the bricks are not self-sustaining, but will become depressed and furnish lodging-places for offensive substances.

The first cost of this brick pavement being a few cents less per square yard than the block pavement, has made it many advocates here; and it will require time to convince its friends that the block pavement will, in a term of years, be by odds the cheaper one. Be this as it may, one thing can safely be claimed for this style of pavement, and that is, there are more recommendations in its favor from a sanitary standpoint than there are for any other street pavement at present in use.

## XVI.

### FOOD IN ITS RELATION TO THE DISTRIBUTION OF WEALTH.

BY A. BLUE, ESQ., SECRETARY BUREAU OF INDUSTRIES, ONTARIO.

The old question, Is life worth living? is still asked, and it still awaits an answer which all men will accept. But in almost every case the men who ask, as well as those who try to answer, view the question largely upon its moral and spiritual sides. Issues are raised which have been issues in the schools for four thousand years at least, and problems are proposed the solution of which, if never found, seems bound to be forever sought. The discussion never advances: there is no transmission of results: no torch is handed on: every thinker starts at the beginning, and his light goes out with himself. I do not say that the problems on their philosophical or religious sides are insoluble in the abstract, or that no good purpose is being served in the study of them. I can conceive of aspects in which the study might be of great utility, by enlarging our ideas of man, of the world he dwells in, and of the divinity that shapes all ends.

But the object of this paper is to take up the question in one of the most material of its relations, and see how far life is made endurable by the means for maintaining it.

Shelter, clothing, and fuel are necessities in a climate like ours, but food is necessary in every climate. Waste of living tissue goes on as the result of bodily exertion, and the store of animal heat is lessened with every breath. How much food is required to repair waste and supply animal heat, keeping the functions of life in healthy play? What is an average ration, measured by quantity and value?

The answer to these questions must vary with the climate, as well as with market prices. Men work harder in Ontario than in Florida because nature is less bountiful here than there, and so they require more of the foods which repair waste. The temperature is considerably lower, too, and so they require a larger portion of the more costly foods which keep up animal heat. In one country the chief diet is fruit and vegetables, rich in starch; in the other it is animal products and cereals, rich in albumen. For this reason it does not seem possible to ascertain a ration which, either as to quantity or value, may be accepted as a standard over any very large area of the world. Between Ontario and Ohio or Massachusetts there ought not to be a marked difference either in the kind or quantity of foods, and so far as I have been able to com-

pare the statistics there is none: it is only in the cost of foods that a difference appears, and it may be that the data are not sufficient to justify comparison under this head. I shall therefore limit what I have to say on the subject to conditions found in Ontario, as shown by investigations carried on under my own direction.

An effort was made last year to find out the cost of living among the working classes of the province—the cost for rent, fuel, clothing, and food, as well as the aggregate cost. The schedule used in the collection of statistics asked for figures under these heads, to be given with as near an approach as possible to accuracy. Of course absolute accuracy in the returns was not looked for. There are few men in any walk of life who could set down the actual figures of a year's food supply, saving the few who keep detailed accounts of house expenses. The cost of rent is known to every tenant, and fuel and clothing may be very closely estimated without the aid of accounts. But food is an every-day requirement in small or large supplies, and I own that I viewed the returns of its cost with no little mistrust. The average for nineteen towns and cities of the province was shown to be \$47.67 a year per capita, for an average family of 4.54.<sup>1</sup> Was this a trustworthy average, and did it possess scientific value? I had no reason to doubt that it was quite as reliable as a great mass of the figures in a census enumeration. But any one who knows how the work is done will not care to accept even the figures of a census as things which cannot lie, for many of them are given at random, and taken as they are given.

Was it possible to verify the returns of the cost of living by actual returns on a large scale? I applied to a number of colleges and public institutions, and met with a favorable response. Five schools and colleges, four provincial prisons, and four asylums for the insane furnished complete returns of the quantity and value of their food consumption for fourteen days in February, the results of which are summarized in the following tables:

<sup>1</sup> The average number of persons in a family in Ontario, according to the census of 1881, was 5.25.



TABLE I.  
*Description of Persons and Rations.*

INSTITUTIONS.	Number.	Number of rations supplied to persons—				Total rations.*
		Under 5 years.	5 to 10 years.	10 to 15 years.	Over 15 years.	
Schools and colleges, . . . . .	5	14	826	2,330	5,708	8,878
Provincial prisons, . . . . .	4	14	364	1,547	17,403	19,328
Lunatic asylums, . . . . .	4	139	145	56	43,733	44,073
Totals, . . . . .	13	167	1,335	3,933	66,844	72,279

TABLE II.  
*Quantity and Value of a Winter Ration.*

CLASSES OF FOOD.	Schools and colleges.		Provincial prisons.		Lunatic asylums.		All institutions.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Lbs.	Cts.	Lbs.	Cts.	Lbs.	Cts.	Lbs.	Cts.
Animal albuminoids, . . . . .	1.815	9.711	0.855	4.295	1.234	6.181	1.204	6.111
Vegetable albuminoids, . . . . .	0.984	2.287	1.950	3.361	1.156	2.740	1.347	2.850
Starchy foods, . . . . .	1.778	3.215	1.343	1.738	1.672	2.626	1.597	2.461
Miscellaneous, . . . . .	0.021	0.953	0.015	0.375	0.028	1.008	0.024	0.832
Totals, . . . . .	4.598	16.166	4.163	9.769	4.090	12.555	4.172	12.254

These averages are computed from returns of food consumed in two weeks of hard winter weather by 5,163 persons of various ages, as shown in the description,—the total quantity of food supplied being 301,549 pounds, and its value \$8,857. The schools and colleges show a more liberal diet of animal and starchy foods than the other institutions, and the cost of a ration in them is 65½ per cent. more than in the prisons, and 29 per cent. more than in the asylums. In all classes the average is 2.551 pounds of albuminous foods and 1.597 pounds of starchy foods—

\*A ration is taken as the equivalent of three meals per day.

the total ration, including tea and coffee, being 4.172 pounds, and costing 12¼ cents. The items of food are shown in the following table (1) for schools and colleges, and (2) for schools, colleges, prisons, and asylums:

TABLE III.

*Winter Dietary.*

FOOD MATERIALS.	(1) Schools and colleges.		(2) Schools, colleges, prisons, and asylums.	
	Quantity.	Value.	Quantity.	Value.
	Lbs.	Cts.	Lbs.	Cts.
Animal albuminoids:				
Beef, . . . . .	.4457	3.4379	.5041	2.8513
Mutton, . . . . .	.0872	0.7128	.0492	0.3438
Pork, fresh, . . . . .	.0545	0.4002	.0067	0.0492
Cured meats, . . . . .	.0795	0.7115	.0842	0.5567
Fowl, . . . . .	.0075	0.0831	.0032	0.0345
Fish and oysters, . . . . .	.0549	0.4489	.0334	0.2384
Milk, . . . . .	.9643	1.6435	.4491	0.7709
Cheese, . . . . .	.0116	0.1269	.0072	0.0752
Butter, . . . . .	.0965	1.9521	.0614	1.0969
Eggs, . . . . .	.0131	0.1937	.0057	0.0936
Vegetable albuminoids:				
Flour, . . . . .	.4693	1.0935	.1353	0.2732
Oatmeal and cracked wheat, . . . . .	.0728	0.1720	.0648	0.1429
Bread and crackers, . . . . .	.4264	0.9781	1.1004	2.3272
Pearled barley, . . . . .	.0042	0.0168	.0157	0.0437
Beans and pease, . . . . .	.0116	0.0265	.0312	0.0631
Starchy foods:				
Corn meal, . . . . .	.0083	0.0182	.0142	0.0344
Rice, . . . . .	.0131	0.0549	.0239	0.0948
Potatoes, . . . . .	.8969	0.6299	.8281	0.6723
Other vegetables, . . . . .	.1798	0.1756	.4628	0.3765
Green fruits, . . . . .	.4253	0.5867	.0890	0.1233
Preserved fruits, . . . . .	.0541	0.4888	.0425	0.3721
Starch, . . . . .	.0012	0.0132	.0007	0.0122
Sugar, . . . . .	.1579	1.0656	.0883	0.5633
Molasses, . . . . .	.0409	0.1825	.0472	0.2128
Miscellaneous:				
Tea, . . . . .	.0135	0.5563	.0138	0.5291
Coffee, . . . . .	.0078	0.2187	.0098	0.1943
Condiments, . . . . .	.....	0.1780	.....	0.1084
SUMMARY.				
Animal albuminoids, . . . . .	1.8148	9.7106	1.2042	6.1105
Vegetable albuminoids, . . . . .	0.9843	2.2869	1.3474	2.8501
Starchy foods, . . . . .	1.7775	3.2154	1.5967	2.4617
Miscellaneous, . . . . .	0.0213	0.9530	0.0236	0.8318
Total ration, . . . . .	4.5979	16.1659	4.1719	12.2541

This is a winter dietary, and to obtain a standard average for the year it was necessary to get similar returns in a summer month. The beginning of June was selected, but unluckily four of the schools and colleges

were breaking up for vacation, and only one of the five made a report. The returns for prisons and asylums, however, were complete, and so far it is possible to make a comparison of winter and summer dietaries, and to compute a standard ration for the year. The following tables present in some detail the average ration in the several classes of institutions for the two periods:

TABLE IV.

*Winter and Summer Dietary.*

I—COLLEGE. Rations supplied in 28 days, to persons over 15 years, 1,936. Quantity of food, 10,980 lbs.; value, \$372.87.

FOOD MATERIALS.	February, 14 days.		June, 14 days.		February—June, 28 days.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Lbs.	Cts.	Lbs.	Cts.	Lbs.	Cts.
Animal albuminoids:						
Beef, . . . . .	.6534	5.3818	.5374	3.8192	.6054	4.7345
Mutton, . . . . .	.1075	0.8069	.....	.....	.0630	0.4726
Pork, fresh, . . . .	.0494	0.2963	.....	.....	.0289	0.1736
Cured meats, . . . .	.1041	1.0600	.0711	0.8778	.0904	0.9845
Fish, . . . . .	.0309	0.3086	.0873	0.6546	.0542	0.4520
Milk, . . . . .	.8060	0.9392	2.9938	2.3254	1.7123	1.5134
Cheese, . . . . .	.0079	0.0794	.....	.....	.0046	0.0465
Butter, . . . . .	.1252	2.5044	.1646	2.3092	.1415	2.4236
Eggs, . . . . .	.0203	0.2734	.1496	1.1010	.0739	0.6162
Vegetable albuminoids:						
Flour, . . . . .	.0900	0.1798	.0910	0.2269	.0904	0.1994
Oatmeal, . . . . .	.0176	0.0529	.0062	0.0187	.0129	0.0387
Bread and crackers,	.9568	2.2690	.9913	2.8791	.9711	2.5217
Beans, . . . . .	.0220	0.0661	.....	.....	.0129	0.0387
Starchy foods:						
Rice, . . . . .	.0044	0.0176	.0224	0.1010	.0119	0.0522
Potatoes, . . . . .	.8845	0.4427	.9177	0.7668	.8982	0.5770
Other vegetables, . .	.3122	0.2257	.4002	0.4002	.3487	0.2980
Green fruits, . . . .	.1649	0.2196	.....	.....	.0966	0.1286
Preserved fruits, . .	.1208	0.7275	.0947	0.7606	.1100	0.7412
Starch, . . . . .	.0071	0.0679	.0075	0.0599	.0072	0.0646
Sugar, . . . . .	.2584	1.3122	.3354	1.9676	.2903	1.5837
Molasses, . . . . .	.0176	0.1058	.0137	0.0998	.0160	0.1033
Miscellaneous:						
Tea, . . . . .	.0159	0.8157	.0162	0.8105	.0160	0.8138
Coffee, . . . . .	.0141	0.3413	.0162	0.4052	.0150	0.3678
Condiments, . . . .	.....	0.2822	.....	0.3603	.....	0.3146
SUMMARY.						
Animal albuminoids, .	1.9047	11.6500	4.0038	11.0872	2.7742	11.4169
Vegetable albuminoids,	1.0864	2.5678	1.0885	3.1247	1.0873	2.7985
Starchy foods, . . . .	1.7699	3.1190	1.7916	4.1559	1.7789	3.5486
Miscellaneous, . . . .	0.0300	1.4392	0.0324	1.5760	0.0310	1.4959
Total ration, . . . .	4.7910	18.7760	6.9163	19.9438	5.6714	19.2599



TABLE V.

II—PRISONS. Rations supplied in 28 days to persons under 5 years, 28; 5 to 10 years, 504; 10 to 15 years, 2,874; over 15 years, 32,865—a total of 36,271. Quantity of food, 150,478 lbs.; value, \$3,529.62.

FOOD MATERIALS.	February, 14 days.		June, 14 days.		February—June, 28 days.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Lbs.	Cts.	Lbs.	Cts.	Lbs.	Cts.
Animal albuminoids:						
Beef, . . . . .	.5379	3.0261	.4901	2.4513	.5156	2.7576
Cured meats, . . . .	.1645	.8669	.1720	.9638	.1680	.9122
Fish, . . . . .	.0044	.0311	.0451	.2668	.0234	.1412
Milk, . . . . .	.1400	.2263	.1881	.2631	.1624	.2435
Butter, . . . . .	.0085	.1447	.0103	.1752	.0093	.1589
Vegetable albuminoids:						
Flour, . . . . .	.1945	.3070	.0437	.1083	.1241	.2142
Oatmeal, . . . . .	.0409	.0899	.0326	.0749	.0370	.0829
Bread, . . . . .	1.6376	2.8035	1.7612	3.3470	1.6953	3.0574
Pearled barley, . . .	.0232	.0571	.0234	.0656	.0233	.0611
Beans and pease, . .	.0540	.1033	.0472	.0699	.0508	.0877
Starchy foods:						
Corn meal, . . . . .	.0313	.0784	.0301	.0528	.0307	.0664
Rice, . . . . .	.0292	.1130	.0273	.1124	.0283	.1127
Potatoes, . . . . .	.7012	.5868	.9402	.7649	.8128	.6700
Other vegetables, . .	.4709	.4534	.2123	.1511	.3501	.3122
Sugar, . . . . .	.0365	.2094	.0413	.2230	.0387	.2158
Molasses, . . . . .	.0742	.2971	.0531	.2323	.0643	.2669
Miscellaneous:						
Tea, . . . . .	.0098	.2489	.0101	.2542	.0100	.2514
Coffee, . . . . .	.0047	.0658	.0037	.0444	.0042	.0558
Condiments, . . . .	.....	.0601	.....	.0650	.....	.0624
SUMMARY.						
Animal albuminoids, .	0.8553	4.2951	0.9056	4.1202	0.8787	4.2134
Vegetable albuminoids,	1.9502	3.3608	1.9081	3.6657	1.9305	3.5033
Starchy foods, . . . .	1.3433	1.7381	1.3043	1.5365	1.3249	1.6440
Miscellaneous, . . . .	0.0145	0.3748	0.0138	0.3636	0.0142	0.3696
Total ration, . . . .	4.1633	9.7688	4.1318	9.6860	4.1483	9.7303

TABLE VI.

III—ASYLUMS. Rations supplied in 28 days to persons under 5 years, 280; 5 to 10 years, 240; 10 to 15 years, 76; over 15 years, 88,677—a total of 89,273. Quantity of food, 362,543 lbs.; value. \$11,524.14.

FOOD MATERIALS.	February, 14 days.		June, 14 days.		February—June, 28 days.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Lbs.	Cts.	Lbs.	Cts.	Lbs.	Cts.
<b>Animal albuminoids :</b>						
Beef, . . . . .	.5010	2.6564	.6096	4.1738	.5560	3.4247
Mutton, . . . . .	.0631	0.4203	.0050	0.0352	.0337	0.2253
Cured meats, . . . . .	.0499	0.3894	.0116	0.0883	.0305	0.2369
Veal and fowl, . . . . .	.0038	0.0398	.0023	0.0238	.0030	0.0317
Fish and oysters, . . . . .	.0418	0.2869	.0542	0.3571	.0481	0.3224
Milk, . . . . .	.4809	0.8340	.7748	1.3762	.6297	1.1085
Cheese, . . . . .	.0095	0.0977	.0075	0.0801	.0085	0.0888
Butter, . . . . .	.0775	1.3421	.0749	1.2594	.0762	1.3003
Eggs, . . . . .	.0067	0.1145	.0057	0.0518	.0062	0.0827
<b>Vegetable albuminoids :</b>						
Flour, . . . . .	.0421	0.0932	.2270	0.5286	.1357	0.3136
Oatmeal and cr. wheat, . . . . .	.0737	0.1603	.0819	0.1842	.0778	0.1724
Bread and crackers, . . . . .	1.0005	2.3900	.7400	1.8068	.8686	2.0947
Pearled barley, . . . . .	.0147	0.0433	.0168	0.0428	.0158	0.0431
Beans and pease, . . . . .	.0252	0.0529	.0266	0.0646	.0259	0.0588
<b>Starchy foods :</b>						
Corn meal, . . . . .	.0078	0.0184	.0247	0.0510	.0164	0.0349
Rice, . . . . .	.0238	0.0949	.0239	0.0906	.0238	0.0927
Potatoes, . . . . .	.8609	0.7184	.7235	0.5403	.7958	0.6282
Other vegetables, . . . . .	.5163	0.3832	.4250	0.3829	.4699	0.3830
Green fruits, . . . . .	.0604	0.0841	.0172	0.0330	.0385	0.0582
Preserved fruits, . . . . .	.0587	0.5110	.0341	0.3575	.0463	0.4333
Starch, . . . . .	.0010	0.0173	.0021	0.0146	.0016	0.0159
Sugar, . . . . .	.0970	0.6173	.0996	0.6313	.0983	0.6244
Molasses, . . . . .	.0367	0.1819	.0206	0.0964	.0286	0.1386
<b>Miscellaneous :</b>						
Tea, . . . . .	.0156	0.6466	.0157	0.6363	.0157	0.6414
Coffee, . . . . .	.0124	0.2457	.0086	0.1993	.0105	0.2222
Condiments, . . . . .	.....	0.1155	.....	0.1480	.....	0.1320
<b>SUMMARY.</b>						
Animal albuminoids, . . . . .	1.2342	6.1811	1.5456	7.4457	1.3919	6.8213
Vegetable albuminoids, . . . . .	1.1562	2.7397	1.0923	2.6270	1.1238	2.6826
Starchy foods, . . . . .	1.6716	2.6265	1.3707	2.1976	1.5192	2.4092
Miscellaneous, . . . . .	0.0280	1.0078	0.0243	0.9836	0.0262	0.9956
<b>Total ration, . . . . .</b>	<b>4.0900</b>	<b>12.5551</b>	<b>4.0329</b>	<b>13.2539</b>	<b>4.0611</b>	<b>12.9087</b>

TABLE VII.

IV—COLLEGE, PRISONS, AND ASYLUMS. Rations supplied in 28 days to persons under 5 years, 308; 5 to 10 years, 744; 10 to 15 years, 2,950; over 15 years, 123,478—a total of 127,480. Quantity of food, 524,001 lbs.; value, \$15,426.63.

FOOD MATERIALS.	February, 14 days.		June, 14 days.		February—June, 28 days.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Lbs.	Cts.	Lbs.	Cts.	Lbs.	Cts.
Animal albuminoids:						
Beef, . . . . .	.5147	2.8150	.5765	3.7057	.5452	3.2548
Mutton, . . . . .	.0450	0.3012	.0036	0.0253	.0246	0.1650
Pork, fresh, . . . .	.0009	0.0052	.....	.....	.0004	0.0026
Cured meats, . . . .	.0852	0.5442	.0555	0.3340	.0706	0.4404
Veal and fowl, . . .	.0026	0.0272	.0017	0.0171	.0021	0.0222
Fish and oysters, . .	.0304	0.2107	.0522	0.3365	.0412	0.2728
Milk, . . . . .	.3845	0.6538	.6452	1.0887	.5132	0.8685
Cheese, . . . . .	.0066	0.0681	.0054	0.0575	.0060	0.0629
Butter, . . . . .	.0577	1.0039	.0587	0.9810	.0582	0.9926
Eggs, . . . . .	.0049	0.0830	.0060	0.0512	.0055	0.0673
Vegetable albuminoids:						
Flour, . . . . .	.0886	0.1587	.1759	0.4116	.1317	0.2836
Oatmeal and cr. wheat,	.0629	0.1374	.0676	0.1527	.0652	0.1449
Bread and crackers,	1.1906	2.5118	1.0181	2.2351	1.1054	2.3751
Pearled barley, . . .	.0170	0.0467	.0184	0.0484	.0177	0.0475
Beans and pease, . .	.0337	0.0682	.0318	0.0652	.0328	0.0667
Starchy foods:						
Corn meal, . . . . .	.0147	0.0360	.0258	0.0508	.0202	0.0433
Rice, . . . . .	.0251	0.0990	.0248	0.0966	.0249	0.0978
Potatoes, . . . . .	.8196	0.6741	.7843	0.6036	.8022	0.6393
Other vegetables, . .	.4991	0.4015	.3674	0.3207	.4341	0.3616
Green fruits, . . . .	.0441	0.0613	.0123	0.0237	.0284	0.0427
Preserved fruits, . .	.0423	0.3623	.0257	0.2664	.0341	0.3150
Starch, . . . . .	.0008	0.0130	.0016	0.0112	.0012	0.0121
Sugar, . . . . .	.0817	0.5072	.0869	0.5385	.0842	0.5227
Molasses, . . . . .	.0476	0.2150	.0293	0.1331	.0386	0.1746
Miscellaneous:						
Tea, . . . . .	.0139	0.5304	.0142	0.5357	.0140	0.5330
Coffee, . . . . .	.0101	0.1935	.0074	0.1602	.0088	0.1771
Condiments, . . . .	.....	0.1019	.....	0.1284	.....	0.1149
SUMMARY.						
Animal albuminoids, .	1.1325	5.7123	1.4048	6.5970	1.2670	6.1491
Vegetable albuminoids,	1.3928	2.9228	1.3118	2.9130	1.3528	2.9178
Starchy foods, . . . .	1.5750	2.3694	1.3581	2.0446	1.4679	2.2091
Miscellaneous, . . . .	.02400	.82580	0.0216	0.8243	0.0228	0.8250
Total ration, . . . .	4.1243	11.8303	4.0963	12.3789	4.1105	12.1010

In the summary of the last table two unexpected results are presented,—an increase in the summer consumption of animal foods, and a decrease in the consumption of starchy foods. On reference to the detailed materials, however, it will be noticed that the increase of animal foods is almost wholly in the article of milk, the college ration of which was two pounds



more in June than in February. In starchy foods the decrease is in potatoes and other vegetables and fruits, supplies of which were becoming scarce while yet the new season's crops were not ripe for the market. The quantity of the June ration is slightly less than the February one, but the cost is half a cent (.5486c.) higher. The prisons alone show a decrease in cost; in the college there is an increase of over one cent per ration, and had returns been obtained from all the colleges, the June average would unquestionably exceed the February one for all the institutions.

In the Toronto School of Infantry, comprising one hundred men, the following ration is provided:

TABLE VIII.

ARTICLES.	Quantity.	Value.
Beef or mutton, . . . . .	1 lb. 0 oz.	7½ cts.
Bread, . . . . .	1 0	2¼
Potatoes, . . . . .	1 0	1¼
Barley, . . . . .	0 1	} 4
Cheese, . . . . .	0 2	
Sugar, . . . . .	0 2	
Coffee, . . . . .	0 ⅓	
Tea, . . . . .	0 ¼	
Salt, . . . . .	0 ½	
Pepper, . . . . .	0 1-36	} 15 cts.
Totals, . . . . .	3 lb. 6 1-9 oz.	

This is an adult ration, and no doubt the component articles have been selected and the quantities determined with extreme care. Like the colleges, prisons, and asylums, too, the supplies are procured in large quantities, and it is fair to assume that waste is reduced to a minimum. It is scarcely possible for a private family to purchase food at the same prices or to consume it with so little proportionate waste as an institution like one of our asylums or prisons: it may be done, but it is more likely to be the exception than the rule.

Now let us see how the cost of food, as computed from working-men's returns, compares with its cost in the schools, colleges, and public institutions. At the average of winter and summer rations in these it is \$44.17 a year per capita; at the prisons' rate it is \$35.51; at the asylums' rate it is \$47.12; at the infantry school rate it is \$54.75; at the colleges' winter rate it is \$59; and at the rate of the college giving winter and summer returns it is \$70.30. The working-men's average

of \$47.67 is therefore something more than a probable one; it is well verified by the statistics gathered from other sources, and I am disposed to think that the cost of living is better known and more accurately gauged in the families of the working classes than in the families of any other class of the community. I have put the ration question to many intelligent men of good circumstances in this city and elsewhere, and the almost invariable reply has been, "I cannot tell," or, "I have never thought of the matter." And yet there is no economic question of the day of greater importance than the ration of food. In this province of Ontario, with its 2,100,000 people, it means, at the working-man's standard, an expenditure of \$100,000,000 a year, or within \$15,000,000 of the value of our field crops last year. We consume that much to keep up existence, and to fit us for earning the ration of to-morrow.

But food is only part of the cost of living. Shelter, clothing, and fuel are necessities also, and when these are provided, other calls upon earnings are made which are only less imperative in their character. For an average family of the working classes in the towns and cities of this province the cost of food last year was \$216.42, of rent \$74.41, of fuel \$40.53, and of clothing \$86.39—a total of \$417.75. The average earnings of workers with dependents (including the earnings of wife and minor children) was \$447.60 for the year, so that \$29.85 only was left for the almost endless petty requirements of every human household. And these are average figures, the mere fact of which implies that, taking families apart, many are below the standard of their class. Of 1,605 wage-earners with dependents, from whom returns were obtained last year, only 950 had a surplus, the average of which was \$93.07; 410 came out even, cost of living being equal to earnings; and 245 closed the year with an average deficit of \$56.74. To any one of the last class I should not like to put the question with which this paper opens, "Is life worth living?"

But is there no way out for the working-man in the corner? or is it his own fault that his state is what it is? Is he improvident? Does he live too well? Or could he live better on cheaper food and less of it? Doctors and chemists are able to answer some of these questions definitely, for the subject is in their line, and the detailed items of a ration furnish valuable data for the study of it. But the subject is also in the line of the political economist, and he is taking it up. Within the past year a large mass of information has been collected, especially in the United States, and when all the facts are known, when all the data are gathered, I feel confident that the way out will be found. It concerns the great mass of the people of this continent, for at least 85 per cent. of their number, possibly 90 per cent., depend on daily work for their daily living. Do they get a due share of the product of their labor? Is there a fair distribution between the capitalist and the working-man? If they do get a due share, if there is a fair distribution of the products of industry, I should be disposed to agree with that very able economist, Edward Atkinson, and urge the working classes to live on cheaper foods. But

cheaper foods may mean physical degeneracy; and I think it has been conclusively shown by Buckle, that, as a fixed condition, they mean a more rapid increase of population than of capital, a corresponding decrease in the rate of wages, a very unequal division of wealth and power: they mean the tendency to a state in which the democratic element is wanting, where the only business of the people is to labor, and their only duty to obey. The statistics available do not answer the question as to the distribution of wealth with sufficient clearness, but they seem to denote that an inordinately large proportion goes to the capitalist. In Canada, as appears by the census of 1881, the total amount paid for wages in the manufacturing industries was \$59,408,512, while the excess of products over labor and materials was \$70,362,113; that is to say, of \$509.03 net product per capita, the working-man received as his portion \$233.03, and the employer retained \$276. In the United States, as the census of 1880 shows, the amount paid for wages was \$947,953,795, while the portion of employers of labor was \$1,024,801,847; that is, of \$722 net product per capita the working-man received \$347 and his employer retained \$375. In Canada 54¼ per cent. of the product of industry is taken for rent, interest, and profits, and in the United States 52 per cent. of it is taken, while the remainder in each case is given as wages for the skill and labor required in the work of production.<sup>1</sup> This may be a fair and just distribution—the presumption is against it; but all data for determining the question are not in the hands of the public, and in a problem so hard of solution as the equitable adjustment of the relations of capital and labor, every term of the equation ought to be known. It is not a matter that touches the interests of a class of the community merely; it touches the interests of all classes and of the whole nation. Our greatness, strength, and permanency on this continent are intimately dependent on the health, the character, the intelligence, and the independence of the working classes,—for in the fate of the Deserted Village we get a universal truth.

“Ill fares the land, to hastening ills a prey,  
Where wealth accumulates and men decay;  
Princes and lords may flourish or may fade—  
A breath can make them as a breath has made;  
But a bold peasantry, their country's pride,  
When once destroyed can never be supplied.”

<sup>1</sup> Allowing ten per cent. for rent, insurance, and management, and six per cent. for interest on the amount of capital invested in manufacturing establishments, as given in the census (a very doubtful quantity, however), there remains to the proprietors or capitalists in Canada 33.8 per cent. of the total excess of product over materials, and in the United States 28.8 per cent.



## XVII.

### THE INFLUENCE OF SEWERAGE ON HEALTH

By WILLIAM OLDRIGHT, M. D.

*Toronto, Ontario.*

I do not wish to appear before you under false pretences. I have not got a paper. I may say, in justice to the Executive Committee, that when I was called upon some time ago, I thought I should be able to prepare a paper on this subject; but when I was unable to find time to do so, and mentioned that difficulty to the committee, they kindly granted me the indulgence of speaking from a few notes.

The subject that I propose to take up is one more especially in connection with our own city of Toronto; but I would like to say, before making any remarks with regard to the sewerage of this city, that it must not be understood from anything I say that Toronto is an unhealthy city. On the contrary, it is a very healthy one; but we want to make it more healthy still. It has great natural advantages in its favor, some of which have been mentioned in the paper by Mr. Macdougall, which has just been read, and others will be apparent to members of the Association.

The average death-rate of this city for the last four years has been twenty per thousand, which is a pretty fair showing; and inasmuch as we are very strict and accurate in keeping our mortality statistics, that figure may be looked upon as our whole death-rate. We have, as in all other cities, good and bad points in connection with our sanitation. Of course you will hardly expect me to deal with the good ones, and in dealing with the bad ones, you must not assume that they are all bad. I might also say that more especially during the past few years there has been a great deal of attention paid to sanitary matters, and that very extensive works, in connection with sewers, have been going on during that period. In fact, some people think we are getting a little too healthy. For instance, one gentleman, in discussing this trunk sewer scheme, points to our low death-rate in comparison with other cities, and says that that comparison is a very strong argument for keeping our bay in the filthy condition in which it is at present, and for not going any farther in the good work of sanitary reform. I should, in justice to the undertaking profession, say that the gentleman who uses that argument is not a member of that profession. [Laughter.] I propose, in making a few observations on the sewers and sewerage of Toronto, to take up merely those points as to which I have noticed practical results; and after dealing with that subject, I propose to proceed to the burning topic of the day in Toronto,—the question of our water front and intercepting sewers.

Now, while Toronto is not behind other cities in health, and while even in the disease of typhoid fever, which is especially a preventable disease, I do not think she is behind any of the American cities, still there might be a great improvement,—a great reduction in the number of deaths from this disease. Taking the figures for the last four years, I find that the death-rate from typhoid fever in Toronto was, in 1881, 74 in 100,000; in 1882, 69 in 100,000; in 1883, 80 in 100,000; in 1884, 65 in 100,000. I have not as yet been able to get the returns for 1885, and am unable to include them. In 1884, however, the death-rate was materially reduced. But in some of the cities of Europe, where works such as those which are at present contemplated in Toronto have been carried out to the full extent, the death-rate from typhoid fever has been greatly reduced. Take, for instance, Frankfort-on-the-Main, where the death-rate from typhoid fever was formerly 87 per 100,000, but where, after the completion of a perfect system of sewerage, it was reduced to 24 per 100,000. In Dantzic it was reduced from 108 to 18 per 100,000, and in Munich from 242 per 100,000 to 17. I claim, that in Toronto, by proper attention to these matters, our death-rate from typhoid fever should be reduced from 65, the minimum of the four years I have referred to, down to what it is in other cities,—to 24, 18, or 17.

With regard to our sewers, we must bear in mind that not only have they to keep on doing the work they have been doing, but that there is an extra amount of work which should be imposed on them. In some portions of our city, and notably in the older portions of it, we have not, I am sorry to say, entirely abolished the pit system. In what is known as St. John's ward there is a large number of pits. It is hardly necessary to say that this barbarous system should be abandoned, and that we should adopt some such system as that advocated in the able paper by Dr. Baird, to which we have listened this morning,—that is, cremating,—or else this mass of filth must be got rid of by means of our sewers. Toronto having a system of sewers already established, it is altogether likely that the water-carriage system will be carried out, and therefore there is a great necessity, if we are going to pursue the present system, for having an intercepting sewer with an outfall so situated that it can do no harm. There is one portion of St. John's ward (and of course you will naturally say that I have picked out the worst portion) where, by taking the number of houses, and allowing five persons to each house, the population, in a space of 67 yards wide and 200 yards long, would be 500 people, and taking the amount of *fæcal* matter, calculated by physiologists at  $2\frac{1}{2}$  ounces *per diem* for each individual, it would give us in that small space a quantity of something like eighteen tons to be got rid of annually. You can therefore readily understand why we are anxious to do away with such a system as this.

I may say, in passing, that while we have not been able in Toronto to dispense with this wretched pit system altogether, it is being gradually discontinued, and is ceasing to be used in the city. Another thing of which we have had to complain, and which we are endeavoring to rem-

edy, is the deposit of garbage. At one time we had no better way of getting rid of it than by dumping it into hollow places, where afterwards it was covered with a little soil, and in after years houses were built over the deposits so covered. This is being done away with by a cremation furnace, such as was described in the paper by Dr. Baird, and such as are now in operation in Montreal and other places.

With these remarks regarding the disposal of sewage, let us turn to the question of the sewers proper. With regard to the materials of which sewers are made, we are in Toronto making an advance and an improvement. During the past year we have had some examples on that point; and I think it is pretty well determined that the materials for the construction of our sewers shall be of the best, and that no others will be tolerated. With regard to the foundation of sewers, there is one part of the city where persons putting in private drains have had a difficulty to contend with which ought to be carefully looked after. There are some portions of the north-eastern part of the town where, in going to a great depth, there is nothing but sandy soil. I have seen drains taken up in that part of the city, after a few months' use, in which the pipes have run up and down in a zig-zag manner, the joints having become broken and the drains full of sand, owing to the imperfect foundation. As a natural consequence, much sickness occurs in the houses connected with such drains. In one row of houses, built by a private individual for the purpose of renting, diphtheria of a severe kind broke out last year. Upon investigation it was found that the drain was laid on sandy soil, without any foundation being put down, and that as a result the drain was in the condition I have described.

Now I mention these facts, and will mention others in pursuance of the argument, that we must have, both in connection with private drains and plumbing, a systematic plan of inspection. I am giving a few instances in which that inspection is most necessary, and would prove, I am sure, most valuable in the diminution of the death-rate. Many of the joints of drains and much of the inside plumbing are left in an improper way. A few years ago I was asked to inspect a public building in the city, and I actually found the joints of a ventilating pipe from some closets made with ordinary factory cotton. One pipe was slipped into the other, and the space between the two stuffed with factory cotton. I might multiply instances of this kind; but they are well known to members of the Association as occurring in various places where an inspection of plumbing is not in force and rigidly carried out. It has not been in the past an uncommon thing for the pipe from a sink to be slipped into the upper end of a box drain, without any cement or any other material to keep out the sewer gas. I do not say that that has been of common occurrence in late years, but I could point to at least a dozen houses where that is the case; and these instances show, I think, the necessity that exists for some system of inspection.

In some parts of the city—I may mention one, a portion of King street between Frederick and Ontario streets, an old part of the city—there is



a good deal of deposit in the sewer. The reason of this is, that below the man-holes little pits have been left to catch the sewage. This took place, I may say, at a time when the notion that it was hardly possible to keep a sewer free from deposit was not exploded. Still the pits are left; but I am happy to say that it is the intention of the city engineer, so soon as other work will allow him, to have this place overhauled. It may be said, Why not pass that by if it is to be soon remedied? I reply, Because in some of the houses connected with the sewer the plumbing has been of the most deplorable kind. In one of the houses in question, I was attending a child with diphtheria. This child was very sick, and whilst it was under treatment, another and another and another took ill. Some of the later cases were not very severe, but they did not yield to treatment. The diphtheria continued for two or three weeks, and I had been pressing on the *pater familias* to have the house examined, and at last he consented. The condition of things which was found there was this: There were a number of weeping drains connected with the house drain without any trap whatever, so that there was no trap between the sewer and the weeping drains. The kitchen sink was trapped, but none of the other appliances were provided with traps. The question suggests itself, What is to be done with weeping drains? It is one of the most difficult questions in connection with drainage. If you put traps in and there is no water to weep, the traps become dry. I would like to ask the opinion of some experienced members of the Association as to what is the best plan to adopt in connection with weeping drains. My own idea is, that it is better not to have them inside the house at all: if you have them at all, sink them *outside the house*, about eighteen inches below the lowest point of the cellar floor, and then have them connected with some drain which will be trapped. I was referring to the cases which occurred in one house in connection with that part of the sewer in which there is a deposit. In that part of King street I have only included about three blocks, and I suppose that in those three blocks the inhabitants of fully half of the houses have had diphtheria in their families within the last two or three years, and in some of them it has been constantly recurring. In some of them we found that the waste-pipes from the sinks were made of galvanized iron, and not trapped at all. These facts all show the necessity for a systematic plan of plumbing and inspection of plumbing. Now the city council and the city solicitor have prepared a by-law in order to give us increased facilities in that direction, to allow us to have an inspector of plumbing, and also to regulate the practice of plumbing, so that plumbers must obtain licenses showing that they are competent for their work. In justice to the plumbers I should say, however, that a great deal of the bad plumbing is not their fault, but is the fault of those who have to pay for it. In letting contracts, people do not seem to understand the difference between good and bad plumbing, and they think that if Mr. So-and-so has had his plumbing done for so much, they also should be able to have it done for the same amount. Still, that, I suppose, will have to regulate itself to a

certain extent. After the system of an inspection of plumbing is introduced, the plumbing will have to be done according to the plans laid down by the health officer, as is the case, I believe, with you, Mr. President, as well as in New York and other places; and if it is to be open to inspection, and put in according to the requirements of the health office, then, of course, the plumbers must have a proper price for their work, and people must pay for it. And if a landlord is building a "skin" house, and says, "I will not have it so," the plumber will be able to turn to him and say, "The board of health will have it so, and so must you." [Applause.] That is one thing we are endeavoring to have in this city—a systematic inspection of plumbing, and, if possible, a licensing of plumbers.

Passing on to another point, I would like to say a word or two on what has been briefly alluded to in Mr. Macdougall's paper, and that is, the ventilation of sewers. I was favored with the attention of this Association two or three years ago at Detroit, whilst I was "ventilating" a hobby of mine, the overhead ventilation of sewers—a principle in which I still believe, as do many others: in fact, I think the number of those who believe as I do in that matter is increasing. I mean, ventilation by a pipe running up at the side of the house, clear of the windows, chimneys, and other openings into the house, and then allowing as free a passage of air up from the sewer as possible. There are some gentlemen here, of engineering experience, whose opinion I would like to hear brought out in this discussion on the question of whether it is proper to have flap doors on the mouths of sewers. My own opinion is that it is not, but that it is better to have plenty of ventilating openings at the upper ends, and allow the air to pass freely into the mouths of the sewers, and through them. I was much interested in some of the experiments mentioned in the last paper—those showing that with a north wind the air current was downward and forward out of the mouth of the sewer.

I would now proceed to touch upon the question of the pollution of our bay. It has been already described in the paper which has been read, and the description has not been overdrawn. That bay front is a disgrace to Toronto. At times the stench from it is sickening, and, though we cannot absolutely point to an epidemic arising from it, we know from all experience and observation that vitiated air is carried from it over the city; and if we had two or three cases of cholera entering the city, it would find there a fruitful soil in which to generate and multiply, and we should have a terrible time. Various propositions for relief by sewerage have been considered, and one of these which is now before the people is so important that I would claim for it the attentive consideration of this Association. I am glad to see His Worship the Mayor present, and I have no doubt he will be most happy to hear expressions of opinion from the members of this body on this important question. In referring to this map [pointing to one of the two maps, illustrative of the existing and the proposed systems of sewerage in Toronto, which were exhibited in the hall], we may go over again some of

the points which have already been taken up and described by Mr. Macdougall. The blue portion covers the most thickly populated part of the city,—the main business and residence portions of the city, and that part along the bay front, all of which are very thickly settled. The bay front extends from the mouth of the Don to what is called the western gap. Our island was at one time a spit of sand, as mentioned by Mr. Macdougall in his paper, passing around the front of the city in the manner shown on the map. At one time the gap there indicated did not exist. The breaking in of the waves has washed the sand away at that particular place. The action of the waves has been washing the sand around, forming the strips of land which are also shown here at the western extremity of the island. I would ask that this point be carefully remembered,—that is, that these points have been gradually extending westward, and also that there has been a constant washing of the sand in this direction. Float experiments have been undertaken by the city, in the endeavor, if possible, to determine the direction of the currents in the lake. In analyzing the results of these experiments, as given in the various reports, we may divide them into two classes—those to the east of the proposed outfall, and those to the west of it. Some of the floats have passed in an easterly direction, and some in a westerly one: they are almost equal, but those in the westerly direction rather predominate. East of this point the greater number of experiments showed them to pass in an easterly direction. The harbor itself is pretty well landlocked, though we have a western and an eastern gap. A breakwater, as alluded to in the preceding paper, has been built around for some distance, and it is the intention of the government to carry it further, lessening the action of the waves at the eastern gap, and reducing its size. Ashbridge's bay, which was spoken of, is here represented, and the red line represents the system of sewerage which is proposed to be built. This line to the left, or the western portion of the map, represents Garrison Creek sewer, which has been alluded to, and it is proposed to carry the intercepting sewer across from the Garrison Creek sewer along the city front to this point, in the east end, which is at the junction of Front street and the Don. It is intended, also, to carry another sewer along the line of Girard street, and to connect these two sewers. Here to the north-east are the Rosedale Ravines, which the members of the Association will have an opportunity of seeing during the drive on Thursday; and a sewer is to be constructed to carry down the water from this more thinly settled portion of the city. The common pipe into which these intercepting sewers empty is to pass across the head of Ashbridge's bay, and out into the lake at the point indicated on the map—a point in the lake not quite three miles to the eastward of the intake water-works cut here indicated on the map, the spot from which our water-supply is taken. That, in brief, is the scheme which has been recommended by Messrs. McAlpine, Tully, and Sproat. The present city engineer, Mr. Sproat, had previously reported in favor of an alternative scheme, one plan being something like this, and the other being to have a sewer pass along



Queen street and another along Gerrard street. Then he proposed to establish pumping works, and pump the sewage coming from the lower portion of the city to the level of Gerrard street, and allow it to proceed by gravitation to the neighborhood of Victoria Park, some six and three fourths miles to the east of the outlet now proposed. Another scheme which has been proposed by some sanitarians, and has been talked about a great deal, is to have the sewage carried to the neighborhood of Victoria Park, and have it pumped on a tract of sandy land, instead of having it discharged into the lake. I am now just relating the various schemes which have been talked about, and the work which has been done, and I think I have about covered all the points. With regard to the present scheme, the fall in the lower portion of the sewer would be one foot in 2,000, and the velocity of the matter in the pipe about two feet per second. That, in the opinion of many engineers, would be sufficient to obviate deposit, if it were kept in that position. But, sir, from the experience in the old country—an experience with which you, Mr. President, are familiar, and I hope you will not hesitate to give us the results of your experience and reading in the matter—it has been found that in some sewers the flow has been very sluggish; but that is a matter upon which you will be better able to speak than I am. But if you now remove that sewer out further eastward, having a larger portion of it under water, and lessening the fall, though you may not lessen the fall in some portions of it, you will increase the portion under water; and it will of course require a greater force to move its contents, and consequently the velocity will be diminished. Now, that is a question I do not feel competent to decide: my fellow committee-man on the provincial board of health, Prof. Goldsmith, C.E., would not undertake to say anything very positive about it. But I think it hardly needs an engineer to argue that if the fall at present proposed is barely sufficient to keep the sewer clear, it would be insufficient if the sewer were extended a mile or two further eastward under water. Then what are we to say about the outfall? Is that a proper place to have it, or not? I believe it may possibly be moved further east; but still it is a question whether it can be so moved, for the reason I have mentioned. I may point out that the calculations which have been made for the sewer have been based upon this position, and have not been based on the assumption of carrying it further east, although it is stated in the report that if it is found that the distance of the outfall from the intake cut of the water-works is insufficient, it may be carried a mile or so further east. Of course it is a question for the engineers to state to the public whether these calculations can be made to apply equally for a mile or so further eastward; and it is also a question for members of this Association to discuss, many of whom are gentlemen of engineering experience.

I have pointed out that the results of the float experiments have been rather negative in their character. It is felt, at any rate, to be an established fact that there is enough of a westward current to make us pause before adopting a scheme by which so large an amount of sewage would

be deposited there. What is the amount of that sewage? This system of sewerage is calculated for an eventual population of 300,000. By the calculation which I mentioned before, the amount of solid faecal matter from that number of people would be from twenty-three to twenty-eight tons per diem; and that, as members of this Association are aware, forms but a percentage of the total solid matter to be carried through the sewers, because you have the whole of the street washings, horse manure, kitchen slops, and other matter of that kind, which, with the excreta, would amount to from sixty to ninety tons of solid matter. In view of that enormous amount of solid matter, I think we should hesitate before deciding to pour it out at this point, when we are not yet sure which way the currents flow. At the same time it is absolutely necessary that we should get rid of this filth at the water front, and I hope his worship the mayor will be able to inform those of us who take the view that this is not the proper outfall, that the adoption of the by-law will not bind us to this part of the system. I, for one, am only too anxious to vote for the by-law on condition that the outfall will be changed if necessary. Of course it must be borne in mind, that to put the outfall further east may necessitate a return to the original scheme of our own engineer, which I believe was framed with a great deal of thought, and after a great deal of attention to the subject. Our engineers have been considering the subject for years, and I repeat that it may require a return to the pumping scheme and the carrying down of the sewage to a point at which there will be no danger of contaminating our water-supply.

## XVIII.

### AN EXPERIMENTAL STUDY IN RELATION TO THE REMOVAL FROM THE AIR OF THE DUST OR PARTICULATE MATERIAL SUPPOSED TO PRODUCE YELLOW FEVER, SMALL POX, AND OTHER INFECTIOUS DISEASES.

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The study of the subject in relation to the purification of the air from the particulate material causing, in wounds, putrefaction, erysipelas, and hospital gangrene, has led to further thought in relation to general infectious diseases. The study of a subject for a special application of principles often opens up to the mind the practicability of arranging the details of methods so as to accomplish other objects than those contemplated in the first endeavor.

The writer of this paper has been for two years making an experimental study of expedients for securing a dustless atmosphere for surgical purposes. It is now generally believed that one of the most important causes of bad behavior of wounds is the prevalence in the air of floating particulate material, the exclusion of which from wounds is important.

After the discovery of oxygen, there came a theory that the decomposition of exudations from wounds and abraded surfaces, attended by foul odors, and evidently poisoning the system, was owing to the contact of oxygen. The history of surgery, for a century past, includes the account of many expedients for excluding oxygen, upon the supposition that the difference in the behaviour of subcutaneous injuries from that of open wounds was to be accounted for by the presence of this or some other gas. It is not until recently that it has been established beyond dispute that the infection which is chiefly dreaded is not gaseous, but particulate, and capable of being separated from the air in which it floats. The surgical problem has been, to open the abdomen or other part, and to keep it open for an hour, if necessary, and, on closing it again, to have it in such a condition, as to material floating in the air, as it would be in if all the proceedings had been carried on subcutaneously. The attempt to reach this desideratum by water filtration has been successful as to those atmospheric agents occasioning putrefaction. It has been found, however, that the germs of mould get through the showers of water to a limited extent. They are the lightest of germs, and develop most abundantly in wet weather and in damp places. The plan by water has been,—first, to moisten the air by steam; next, to carry it through a



shower of water ; to heat it by a stove (except in hot weather) ; and then to carry it through another spray of water. The first thought was to secure a purified atmosphere for an operating-room ; but in the progress of experiment and reflection the plan was improved so as to secure a current of air thus treated, to envelop the wound itself, so that impurities escaping from the occupants of the room could not come in contact with the wound, being blown away by the blast of pure air. Finding that air cannot be completely deprived of its floating material by water, attention has been given to the devising of a practical plan for purification by the passage of air through cotton. The capability of cotton of arresting all particulate material floating in the air is a remarkable discovery. Most interesting details of experiments to prove the power of cotton in arresting the agents of putrefaction changes may be found in the *Popular Science Monthly* for February, 1878, page 476, and March, 1878, page 591, in which the observations of Professor Tyndall upon this subject are related. The fact that a seal of cotton prevents any kind of material from decomposition, provided that the agents of decomposition are not already in it, shows, first, that these agents are not gases, for anything of a gaseous nature goes readily through cotton ; and, next, this fact shows that gases do not initiate decomposition, and that particulate material does. This proposition has been so thoroughly worked out by experiment and observation that it is not worth while to go over the proofs. The work of experimentation with culture liquids is greatly facilitated by this knowledge. The experimenter has only to put a plug of sterilized cotton into the mouth of a test tube containing the liquid under observation, and to subject this liquid to daily boiling for a few times, in order to be sure that it is free from organisms, and he has a liquid under circumstances to keep free from decomposition for an indefinite period. On the introduction of any infectious material to be experimented upon, he is equally free from the annoyance of the introduction of any atmospheric agent, unless the intrusion takes place at the time of opening the cotton seal. This is readily seen to be much more convenient of management than flasks hermetically sealed. The same tubes can be used over and over to any extent. The problem for perpetuating the sterilization of stationary or still air is thus completely worked out. The arrangement for an apartment of many feet in dimensions is as simple as that for a test tube.

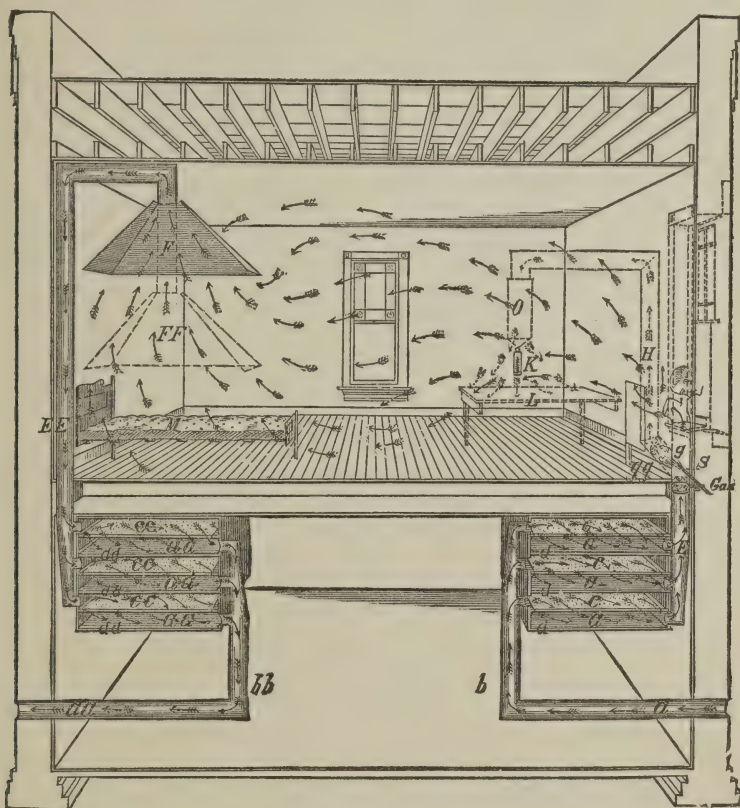
The problem now in hand, however, is to secure the sterilization of air in motion, and which can have no boundary wall between it and the ordinary atmosphere when sterilized air is to be employed for surgical purposes. The use to be made of such air is, (1) to secure to a surface freedom from the influence of septic or pathogenic agencies, at the same time that it is being manipulated for surgical or other purposes ; and (2) to secure for living beings an air to breathe, free from infectious agencies ; or to take immediately away the products of exhalation from the lungs and other parts of the body. A portion of fruit may be sealed in a can by cotton or by solder, and it will keep indefinitely ; but a

breathing animal, to be free from septic or pathogenic agencies, when these agencies are round about him, must have some other arrangement, by which his own exhalations may be carried away. If it is intended, in a particular case, to shield a person from the infection of yellow fever in an infected location, the filtration of the air to arrest the particulate material of the infection must permit a perpetual change. This is secured in a great degree by respirators worn upon the face, which are usually made to sterilize the entering air, and perhaps might be made to sterilize the air of expiration. To prevent a subject from taking a disease, the filtration of the inspired air is required; and to prevent his imparting a disease, the filtration of the air expired must be secured.

The endeavor at present in hand is to secure an arrangement which may take a company of men in an ordinary room and do for them what the respirator is supposed to do for one man. The suction by the expansion of the chest is a force capable of drawing a sufficient quantity of air through the cotton in front of the lips and the nose; but for the face respirator, the problem of sterilizing the expired air has not been worked out, because it would be extremely inconvenient to blow with sufficient force, during each expiration, to propel the expired air through a cotton sterilizer. On a large scale, however, the difficulty vanishes, because it is as easy for a fan to push as to pull.

The device on the one hand for blowing the fire of a furnace, and on the other hand for sucking away the sawdust of a circular saw in a planing-mill, is the finger-point toward the arrangement needed. This is an instance in which inventions for particular purposes become equally valuable for far different ends. In any establishment in which there is an engine, or a motor of any kind, the remainder of the detail may be easily worked out. The problem is not difficult if the air is to be stationary; but the circumstances require that a considerable quantity of air shall be supplied, and be quickly replaced by another supply, in order that the impurities generated may be carried away. All know the effect of a hedge or a strip of forest in arresting the force of the wind in the winter, when there are no leaves, but only the filter of limbs. What these limbs are to the wind, a layer of cotton is to the current of air employed for the purposes referred to. As it is important for surgical purposes that the sterilized air should have a temperature equal to that of the body, while it is comfortable to have the general air of the room much lower in temperature, there arises the difficulty of the tendency of the warm air to rise to the upper part of the room, instead of enveloping the wound of a patient under operation, or surrounding a sick man lying upon a couch. It is entirely practicable to secure a sufficient degree of motion by means of heat, if there is not the impeding effect of the cotton. To overcome this difficulty, the force of a fan is employed which is run by an engine. By establishing a hurricane on one side of the cotton, a moderate wind is secured on the other, having a force sufficient to overcome the effect of light specific gravity in the warm sterilized air. For

surgical purposes, the addition of a small amount of steam is desirable in order not to dry the exposed moist surfaces, and an arrangement for that purpose is seen in the drawing.



- a*, Inlet pipe.  
*aa*, Outlet pipe.  
*b*, Ascending inlet pipe.  
*bb*, Descending outlet pipe.  
*E*, Ascending inlet pipe.  
*H*, Ascending surgical pipe.  
*O*, Descending surgical pipe, to be raised or lowered.  
*K*, Thermometer.  
 Under *g* and over *gg* is the oblique surgical branch of the inlet pipe.  
*Gas*, Gas flame for regulating the temperature of the air escaping from *O*.  
*S*, Steam jet for regulating the moisture of the same air.  
*g*, At the top of the straight pipe *g* is an eye looking at the flame below. Above *g* is the curved end of the inlet pipe for the sanitary use of purified air.  
*gg*, Over *gg* is a screen to interrupt the straight horizontal blow of the same air.  
*EE*, Descending outlet pipe.  
*F*, Canopy.  
*FF*, Canopy let down.  
*L*, Surgical table in section.  
*M*, Sanitary bed in section.  
 The important objects are in section.



The other surgical necessity, that of a temperature equal to that of the body, is secured by gas jets in the courses of the pipe carrying the sterilized air.

The figure represents a scheme for sterilizing the air which enters a room for protection against infection, one for sterilizing the air escaping from a patient who is supposed to be afflicted with small-pox, or some other infectious disease, and also one for securing sterilized air to envelop a wound. In this scheme the particulate material is supposed to be arrested by the cotton, which, at the end of the necessary period, can be burned.

The arrangement is in the form of a chest of drawers, the outside of the chest being a cube of fifty inches. There are three drawers, each having an area of cotton 40X40 inches, equal to 1,600 square inches, the area of the three being 4,800 square inches. There are two air-tight floors besides the lower floor of the box—one below the upper shelf, and one below the middle shelf. The air enters above each shelf of cotton, and escapes below it. A sheet of woven wire with three-quarter-inch openings serves as the support for the cotton, which is about an inch in perpendicular thickness. For blowing sterilized air into a room, the blower must push. For taking foul air out of a room, the blower must pull. The arrows show everywhere the course of the current of air.

Observations are in progress to prove the approximation to perfection of this device for depriving the air of the material in it which is capable of starting and perpetuating changes in organic substances.

The value of an expedient like this on shipboard must be obvious at first sight. The patient being confined in an apartment, an arrangement may be made to be run by the machinery of the ship, to give him pure air, or to purify the air which is poisoned by emanations from him, or both combined.

An experiment to determine the penetrability of cotton by gases while the particulate material is arrested has been made by burning sulphur in the air previous to its passage through the cotton, and finding that the sulphur dioxide passes readily through, while the particles which ordinarily give a blue tinge to the sulphurized air have been arrested in the cotton mesh, leaving the air perfectly transparent.

The expedient here explained and illustrated is not necessarily connected with a movement of the air by means of a fan, but for surgical purposes. When it is important to have the movement alike with each performance, the certainty of this regularity is more important than the question of expense. For the ventilation of wards in a hospital, however, the motive power for the movement of the air may be the same as in ordinary ventilation, by connection with chimneys, the warmth of which invites the air to rise, thus securing a change of air in those rooms which supply air to the chimney draught. In any practical application of the principle, it must be remembered that the friction or resisting force of cotton of sufficient thickness is very large, requiring an additional draught of the chimney to secure a change of air with sufficient rapidity.

The room in which this scheme has been worked out for *surgical* purposes has a capacity of 3,360 cubic feet.

The blower (No. 00 of the Sturtevant manufacture) revolves 3,512 times in a minute. This is a rate of speed which makes very little noise, and is sufficient for the purpose. At this rate of speed it is estimated by the manufacturer to carry 662 cubic feet of air in one minute. This rate of air-supply would completely change the air of the room in five minutes. There are, however, three elements of loss, viz., the slipping of the band, the escape by leakage through a long pipe, and the resisting influence of friction by which the fans of the lower slip on the air which they propel. It may be assumed that this loss amounts to one half. The air of the room would then be completely changed once in ten minutes. It will be readily conceived that an outbreak of an infectious disease on board a ship is manageable with an apparatus such as is here contemplated. The air of the apartment occupied by the patient can be changed with any desired degree of frequency, and be blown off into the outer atmosphere, or purified by being passed, in the course of its exit, through another chest of cotton.

It is practicable to arrange the details of the apparatus here described so that it may be placed on wheels and temporarily set up alongside of any house, and kept running during the period of any emergency.

## XIX.

### REPORT OF THE COMMITTEE ON DISINFECTION OF RAGS.

COLLATED EVIDENCE, CHIEFLY FROM RECENT PUBLICATIONS, ON THE  
PROPAGATION OF DISEASE BY RAGS AND THEIR CONGENERS—IN-  
FECTED CLOTHING.

The following summary is made in virtue of the vote of the Association on the eve of adjournment at its last session, Washington, December 11, 1885, to refer back to the Committee on the Disinfection of Rags the preliminary report it had made by special direction of the Association, on the implied ground that the said report was not justified by evidence.

Dr. Ruijsch, of the Hague, read a paper before the Fifth International Congress of Hygiene, at the Hague, 1884, on "Rags—A National and International Danger," in which he proceeds "first to examine the amount of danger there is in infected rags, old clothes, linen, and wearing apparel." "When commencing our inquest," he remarks, "we consult the annals of the Medical Inspection of Netherlands since 1865, we find a long array of facts—alas! too long—stated by the medical inspectors, which show that in Holland also rags and old garments have had a large influence in propagating diseases.

"In 1868 various men working in a paper-mill at Wormerveer had been handling rags from infected origin, and were taken with typhus.

"In 1870 the first cases of small-pox that appeared at Breda were among persons who had been washing infected clothing from a small-pox patient, coming from an infected district. In 1870, 1881, and 1882 the same thing happened at Utrecht.

"In 1873 a pillow infected by a small-pox patient caused several cases of small-pox to appear at Goreem, while in that same year a rag-picker's daughter was attacked after having bought some rags from a person who had had small-pox, and caused also a new epidemic to break out. The appearance of the disease at Ohé and Laak, and at Olkmaar, was also due to the importation of infected clothes from infected localities in Belgium and at the Hague.

"The origin of the small-pox epidemic in 1871 at Heerde and Epe the medical inspector attributed to rags. In that same year Schyndell and Rozenburg were invaded with small-pox by the importation of infected clothes from Schiedam. The cases of small-pox that broke out in 1873 in the hospital at Utrecht were traced to insufficiently disinfected



bedquilts, which had been infected by small-pox patients treated there in 1872. The same origin is given to the Tilburg epidemic in 1873.

"In 1870 and 1880 consecutively were attacked with small-pox persons who, while working in a paper factory at Maestricht, had been handling rags, or had visited the locality where rags are selected, whereas during all that time no other case of the disease was known in Maestricht, but only in Belgium, whence the suspected rags were partly coming. In 1880 a dealer in rags conveyed small-pox from Rozindaal to Vouw. In 1881 the infected rags from Gouda caused an epidemic at Barendrecht, etc., etc. It would be a waste of time to cite all the cases where rags and infected linen have brought on epidemics.

"And when we look at the report on cholera, we are amazed to see that its origin and propagation are always traced to the influence of clothing, dresses, and the traffic in old garments and rags. Thus, a rag-picker from Amsterdam, where cholera was raging, introduced it into the city of Tilburg in 1866 in a truck-load of infected clothes. At Druuten a rag-picker was the first victim in that commune. At Mearssen the first one attacked with cholera was a rag-man. Again, at Heusde, Oudenbosch, Hindelopen, Nieusisburg, Leeuwarden, and Bois-le-Duc cholera was propagated by the handling and washing of old clothes, clothing, and bed-clothing, etc.

"In England, France, Germany, etc., the same facts go to prove the propagation of diseases, and principally of small-pox. One of the most interesting works on this subject is certainly Doctor Gibert's report on the epidemic at Marseilles, that had exactly the same characteristics as the small-pox epidemic of 1874 and 1875, and proved beyond doubt the great influence of rags on epidemics. So, to cite only two facts, in 1874 there were 117 rag stores in Marseilles, of which 46 were in one district. In that district the number of deaths from small-pox was three times larger than in any other district, while of 157 cases of death 64 occurred in rag-pickers' houses, or in houses in close proximity to rag-pickers or rag stores. In that district Gibert found a cellar, a secret store-room for rags, which infected six persons, of which four died."<sup>1</sup>

Dr. George M. Sternberg, U. S. Army, in a letter to the *New York Medical Journal* (August 29, 1885), quotes from a letter he had received a few days before from Dr. Sondenegger, president of the Swiss Aerzte Commission, and delegate from Switzerland to the International Sanitary Conference of Rome, as follows:

"The fact relating to rags was observed and described by Professor Biermer (living now in Breslau as Professor of Practical Medicine), and by Dr. Zehnder, Vice-Director of the Board of Health (Sanitätsrath), who were both most active at the time of cholera at Zurich in 1867: July, August, September, October—number of patients, 684; number of deaths, 65.9 per cent.

"Kriegstetten is a small village in the Canton of Solothurn, at eighty to one hundred kilometres' distance from Zurich, and not connected with

<sup>1</sup> *The Sanitarian*, September, 1885.

this town either by water (lake, river, marsh), or by trade and industrial commerce. There is a paper-mill at Kriegstetten, and a workwoman, who had to tear the rags, was suddenly taken with cholera, and died the following day. The following days sixteen more workwomen (all occupied in tearing the rags) were taken sick; of these, eleven died. A careful examination showed that all of these rags went from Zurich, and from cholera houses; therefore, the whole mass of rags was disinfected by boiling. After this no case of cholera occurred. The large establishment of the paper-mill, as well as the village, remained free. I mentioned the fact in a little address to the Swiss people, which I have the honor to send you; and nobody doubted the fact, or made any opposition. The fact was known everywhere in Switzerland."

Dr. Wm. M. Smith, health officer of the port of New York, and *ex-officio* member of the State Board of Health of New York, and of the health department of the city of New York, in an official report to the last named body, October 16, 1885, makes the following citations in addition to those of Ruysch already referred to:

The *British Medical Journal* of May 11, 1878, p. 686, speaks of "rags as disseminators of disease," and refers to "the measures taken by the Austrian government to prevent the spread of disease by obtaining the adoption of uniform precautions in all the neighboring states, in the shape of strict enforcement of sanitary regulations and the prohibition of the importation of rags." "The authorities of Austria," the article remarks, "have for some time forbidden the importation of rags." Vol. i, p. 863, of the same journal, says,—“An epidemic of small-pox, which spread somewhat widely, broke out at Abenheim, in the Canton of Worms, Rhenish Hesse. Almost all the patients at the outset were five women, who worked in a rag-factory cutting up and assorting rags. The cases were investigated, and it was found that a portion of these rags came from Marseilles, where small-pox prevailed to a serious extent.”

The *British Medical Journal* of July 3, 1880, vol. i, p. 21, says,—“Girls who worked at storing rags at Canterbury contracted the disease and communicated it to twelve others.” “The then health officer said that during the period of three years there had not been a case of small-pox in the city the origin of which had not been traced to the factory.” In 1878 cases originated in the same factory. In 1879 another case occurred there. Dr. Butterfield, in his last annual report on the health of Bradford, wrote,—“No case of small-pox had occurred in the borough for many months, when a girl who had not left the neighborhood was taken sick. In a few days another young woman employed in the same work exhibited symptoms of the disease.” “March, 1878, several persons, residing apart, but working in the same room at a rag-warehouse, were simultaneously affected with small-pox, and from them extended to about thirty others.” “At Whittlesford, in 1873 and 1875, there were two outbreaks of small-pox from the same cause.” “At Thetford an epidemic of six months’ duration, and from which sixteen or seventeen

deaths resulted, was traced by Dr. H. J. Hunter to two women engaged together in cutting up some foreign rags, and who fell ill the same day."

Under date of January 20, 1883, the *British Medical Journal* said,—  
 "An outbreak of small-pox has just taken place at New Cathcart under peculiar circumstances. A local firm of paper-makers received in December last a quantity of rags from Königsberg *via* Leith. The work-people in their employment have been engaged in cutting them up recently, and within the last few days four of them have been seized with small-pox, and some others have sickened with what is feared will turn out to be the same disease."

The Thirteenth Annual Report of the Local Government Board (of England, 1883-'84) contains the following in the report of the medical officer of the board:

"Of infectious diseases which are known to have been conveyed to persons engaged in the rag trade or in paper-making, small-pox is by far the most frequent." And again he remarks: "It has been thought desirable to take exceptional precautions to prevent the introduction of cholera by them [rags] into English ports."

The restrictions on the importation of rags at the port of New York are by no means without precedent. Reference has been made to the restrictions by Austria. Holland has a very rigid inspection law. And a French decree, dated as early as March 15, 1879, compels "all rags imported into France by sea to be disinfected; and the importation of rags is restricted to certain ports where disinfecting apparatus have been provided." In order to evade this, rags have been unloaded at neighboring ports in other countries, and thence carried by land across the frontier. With a view of preventing this, it has been recommended that the importation be restricted on land to places where a disinfecting arrangement is provided.<sup>1</sup>

The following is from the *British Medical Journal* of May 2, 1885:

"The Woodside Rag Works at Aberdeen, the outbreak of small-pox amongst the workers in which was the subject of a question by Dr. Farquharson on April 23, have repeatedly been the scene of similar outbreaks of the same disease, and it would be worth while, therefore, that some special inquiry should be made as to the precautions adopted by the proprietors for preventing such occurrences in future.

"Some of the better known paper-makers in England have now a regular set of regulations for minimizing the danger arising from the handling of infected rags. It is impossible, perhaps, absolutely to prevent the occurrence of a case of small-pox from this cause without measures of disinfection being applied to all rags. Although we have no reason for assuming that other diseases are not spread by rags, we have chiefly records of small-pox distributed in this way."

Section 49 of the Scotch Public Health Act of 1867 (corresponding to section 125 of the English act of 1875) imposes a penalty on any person who "gives, lends, sells, transmits, or exposes, without due disinfection,

<sup>1</sup> See *British Medical Journal* of August 4, 1883.



any bedding, clothing, rags, or other things which have been exposed to infection from any dangerous infectious disorders." The belief that old rags communicated contagion is so considerable in England that it has been the subject of discussion in the House of Commons.

*British Medical Journal*, August 25, 1883, p. 397: "House of Commons, August 15, 1883. Importation of Disease by Rags. Sir S. Northcote asked the president of the Local Government Board whether his attention had been called to some cases of small-pox reported from a place in his constituency, which were supposed to have originated from foreign rags among people employed in certain paper-mills. There was one death last week, and there had been several other serious cases of illness. He called the attention of the Local Government Board to the subject in the hope that some restriction might be devised to check the propagation of infection by rags."

The *British Medical Journal* of 1880, vol. i, p. 952, has a report by Dr. Henry S. Alford, medical health officer in the Tauton district, in relation to the Abenheim epidemic of small-pox, in which he alleges that the disease was communicated by "rags that had been on the premises six months, and were obtained from Russia or Wales." No cases had occurred in the village, nor had the girls first attacked left home.

#### CHOLERA AND SMALL-POX COMMUNICATED BY CLOTHING.

"John Barnes, a laborer, had been suffering for two days from diarrhœa and cramp, when, on December 28, he was taken ill with the symptoms of cholera and died. The next day Barnes's wife and two other persons who visited the sick man were seized with cholera, but recovered. The son of the deceased man then arrived. It appears he had been apprenticed to his uncle, a shoemaker in Leeds, and that his aunt died of cholera fifteen days before, her effects having been sent to Barnes without having been washed. The trunk containing the things had been opened by Barnes in the evening, and the next day he was taken ill and died."<sup>1</sup>

"In 1854 cholera was not known in the county of Bedford, when it broke out in the village of Ridgmont, and eleven cases occurred, all of which were fatal. It was ascertained that the first case occurred in a man whose son had died of cholera in London a week or two before, and whose clothes were sent down to the country. The poor man unwrapped the bundle of clothes himself; he was seized with the disease and died. This case was the nucleus of the others. An instance of similar nature was reported from Lustheim, near Munich, where the first case of cholera was generated in the house of a laborer, one of whose daughters was in service at Munich. The latter sent her parents clothes belonging to a family some members of which had just died of cholera. These old clothes were at once appropriated and worn. Three days afterward (September 21, 1854) the father and mother were seized with cholera and died. On the 22d and 25th other members of the family

<sup>1</sup> *Lancet*, vol. ii, p. 109.

took the disease. Dr. Lebert reports the case of a man who was attacked with cholera, having worn the clothes of a person who had died of the disease two months previously.

"On the 24th of December, 1848, a woman and two children died of cholera in Suon Fields, Southwark. The clothes of the children were sent to Boston for the use of a third child living with its grandmother. The old lady and child unpacked the parcel, and both were attacked with cholera. There were no other cases in Boston until eight months afterward.

"It is well authenticated that during the epidemic in the United States in 1873 cholera was introduced in effects of emigrants. The vessels which brought them were in perfect sanitary condition. Passengers were healthy, and remained so after landing and until they reached Carthage, O., Crow River, Minn., and Yankton, Dak., where their goods were unpacked. At each place, within twenty hours after poison particles were liberated, the first case appeared."

Dr. H. B. Baker of this committee communicates the following:—"Many years ago, in one of the early outbreaks of cholera in the then north-west, a mattress soiled by a cholera patient was thrown overboard from a vessel on or below lake Huron. The mattress floated down the St. Clair river, and being seen from the shore, a man went out in a boat and brought it to the shore, where his wife washed and cared for it. This man and his wife both contracted the cholera. I had this information from Capt. E. B. Ward, from whose vessel the cholera-soiled mattress was thrown overboard."

If the contagion of cholera may be preserved in clothing for weeks and months, why not in rags? From the collection of the works of the "Comite Consultatif" of Public Hygiene, Paris, 1883, vol. xii, p. 83. Council of Public Hygiene, Dr. Vallin, Reporter. (Translation.) Depot and Sorting Warehouses for Rags:

Rag-sorting is done on a vast scale in the department of Oise, particularly at Criel. The quantity of material which comes to the warehouses has a value of 15,000,000 francs per annum. An epidemic of variola, which devastated the Arrondissement in 1877 and 1878, has been attributed by Dr. Boursier, member of the Council of Hygiene in the Arrondissement of Senlis, to the propagation of variolous virus by the rags. About July, 1878, five sorters of rags working in the warehouse at Criel were attacked with small-pox. They conveyed the disease to their relations and neighbors; their soiled clothing infected the proprietor and workers in a floating laundry. The course of the epidemic could be followed from its point of origin to twenty communes. The deaths at Criel, Montataire, and Nogent were twenty-two; in the Arrondissement, forty.

Garments by chance whole are taken by the class of unmarried working people, who are destitute of resources. Others, which have been patched or worn too much, serve for wiping-cloths for the machines in factories. All white goods, linen or cotton, are destined for the paper-

mills, except a slight amount of old linen deducted for charpie or surgical dressings. The best is sent to English paper-mills on payment of the customs. Colored fabrics, cotton or half linen, are also the subjects of a minute classification, and the refuse is sold as waste. The rest passes to the weavers for manufacture into new fabrics. The dust raised by this sorting is horrible and infective. This dust contains, sometimes, virulent germs.

State Board of Health, Michigan, 1882, Allegan county, page 393.—Dr. B. Thomson, health officer of Plainwell, reported on April 15, 1882, small-pox contracted while working in a paper-mill, from which three other cases originated.

Sixth Annual Report State Board of Health, Connecticut, 1883. General Report.—Small-pox, page 22. "The disease was several times introduced by tramps, more often by emigrants brought up from New York for domestic or out-door service, and a few times by paper-rags. This is the principal danger from the latter source, as shown by the investigation made by the board a few years ago, and perhaps the only one that is liable to occur at any time. As New Haven is the chief port of entry for the state, and one of the three principal ports of entry for rags in the country, the chief danger will occur there." Secretary's Report, page 225.—In Manchester and Windsor Locks there were several cases (small-pox) infected from paper-rags, and in the latter place the disease broke out the second time in the same locality.

State Board of Health, Michigan, 1881. Secretary's Report. Proceedings of board, July 12, 1881.—"Dr. Jackokes mentioned the formation of a sanitary association at Pontiac, and said there was need for such effort there. He spoke of the spread of small-pox by an immigrant tramp-burglar, who communicated the disease to another prisoner. The clothing left in the pest-house was supposed to have been disinfected, having been treated for that purpose, the pest-house locked up and labelled. The clothing was stolen, however, and the disease communicated to sixteen persons by it, and the disease still further spread by them. He said the information as to what constitutes disinfection was much needed there, and it was owing to inefficient disinfection that the disease was conveyed by the clothing." Also, page 295, Prevention and Restriction of Small-pox: Section 22, Rags.—"No person should handle old clothing or rags without taking precaution to prevent the spread of communicable diseases. Children should not be allowed to go near a rag-picker's collection, nor into the rag-rooms in paper-mills or store-houses."

Fifth Annual Report, Massachusetts State Board of Health, 1877. Article headed, Health of Towns. Answer of correspondents, page 548: West Springfield.—"We, in common with the rest of the state, suffered from small-pox, originating in the rag-picking of one of our paper-mills, and spreading rapidly, there being no care taken to isolate the sufferers."

Connecticut State Board of Health. Fourth Annual Report, 1881. It is said, in report of small-pox,—"One or two instances, where



paper-stock was the medium of conveying the contagion, should have been mentioned."

State Board of Health, Michigan, 1878, page 62:—"June 6, 1878, William Simonds, M. D., health officer of Warren township, Macomb county, reported details of twenty-three cases of small-pox, occurring from February 1 to May 17, 1877. In some of the cases the disease was derived from clothing from the city; in some cases, from the paper-mill. Of the twenty-three cases, seven died."

Annual Report State Board of Health, Wisconsin, 1882. Secretary's Report, page 53, Small-pox:—"A single case, the origin of which could not be ascertained, occurred in the city of Appleton. It was conjectured that infected rags at one of the paper-mills caused the case, a relative of the patient being employed in the sorting-room of one of these establishments." Page 58, Dr. Grasmuck, of Menasha, writes as follows: "A case of variola was discovered here (January 21) to-day; is about the sixth day of development. It had been kept hidden, and many have been exposed. The disease was probably contracted at the paper-mills."

Massachusetts State Board of Health, 1873, page 463.—Extracts from table showing cases of small-pox in the state of Massachusetts in 1872, and February, 1873, such table being made in pursuance of order passed by house of representatives, January 21, 1873:

CITIES AND TOWNS.	NO. OF CASES.		PROBABLE SOURCE OF INFECTION.
	1872.	Feb. 1873.	
Adams.....	34	.....	Paper rags.
Blackstone.....	10	.....	"
Cummingtown.....	19	.....	"
Dighton.....	17	.....	"
Fitchburg.....	24	1	" and Boston.
Holyoke.....	32	.....	"
Huntington.....	3	.....	"
Lee.....	14	1	"
Montgomery.....	6	.....	"
West Boylston.....	1	.....	"
West Springfield.....	12	4	"
South Hadley.....	8	.....	" Holyoke.
Dalton.....	6	.....	" Lee.

National Board of Health, *Bulletin*, vol. i, No. 4. Washington, D. C., May 1, 1880: Ypsilanti, Mich.—Dr. E. Batwell, health officer of

this town, reports to the state board of health two cases of small-pox in which the contagion was ascribed to rags at the paper-mills. A girl working in a paper-mill, and her brother who was daily about the rag-room, were seized with variola at the same time. Several neighbors were exposed before the nature of the disease was made known.

Second Annual Report Wisconsin State Board of Health for the year ending December 31, 1877. Extracts from communications of correspondents by the secretary of the board; page 140, Menasha.—“During the year ending September, 1877, the city of Menasha was visited by an epidemic of small-pox, extending from December, 1876, to May, 1877, assuming in progress a severe form. During that period about seventy cases occurred, with a proportion of deaths of nearly one to six. From May to December several more cases were reported, but no deaths, most of the cases assuming a mild form. The epidemic originated in the paper-mills at Neenah, and the cases occurring in Menasha all sprung directly or indirectly from that source. The first two cases that came under the care of a physician fell into my hands. They were young women, eighteen to twenty years of age, who had been working in one of the paper-mills at Neenah, and had never been vaccinated. Had the proprietors been more thorough in enforcing vaccination among the employés, I am certain the epidemic would not have been so widespread. So late as April 26 I attended a case that originated in one of the mills. The patient had worked there two months or more without being vaccinated.” Page 141, Neenah.—“Beginning in November, 1876, simultaneously in this city and Menasha, small-pox continued, with short periods of intermission, through the winter, and well into warm weather in the spring. During this time there were in this city some twenty unmistakable cases, the mortality being light; while in the neighboring city of Menasha the number of cases is estimated at sixty, with a much larger proportion of fatal cases. In both places the original and principal source of infection was the paper-mills.”

Also, same report, page 95. Supplementary Report on Small-pox, by E. L. Griffin, M. D., of Fond du Lac, President:—“In Neenah and Menasha the disease was believed to have been communicated by means of paper-rags brought from Milwaukee. There were three distinct cases in as many different families, which were reported at the same time, being three girls who were employed in sorting rags in the paper-mills. During the course of the season there were new cases from time to time, emanating from the mills. This special origin of small-pox indicates a special and peculiar danger from infectious and contagious diseases to a community in which paper-mills are located, and calls for unusual vigilance and hearty coöperation on the part of the proprietors of such establishments and the citizens.”

In reply to inquiries made touching this source of danger, Dr. J. R. Barnett, of Neenah, writes,—“I have given the question of rag disinfection some thought, and in a recent communication to the secretary of the state board of health I advised the procuring of legislation compelling

disinfection before rags can be handled in paper-mills. As to the particulars of such a bill I have thought but little; but there can be as little doubt as to the practicability as there is to the desirability of suitable legal restrictions upon the trade in and handling of paper stock. Most of the stock used in the Neenah mills, of which there are four, turning out an aggregate product of ten or twelve tons per day, requiring fifteen to twenty tons of rags, must of necessity come from abroad. The large cities are the depots and principal primary source of supply, because it is in the cities alone that the small economy of rag picking and saving is reduced to a science; at least, what is gathered into the 'junk' shops from the country is turned into the mass and baled up with it, sharing its various kinds and degrees of infectiveness without adding any element of safety. The bales thus sent out of the paper-mills are infernal-machines for the dissemination of zymotic poisons. There are few cities of 100,000 inhabitants and over, where small-pox is not in perennial bloom. There are consequently few consignments of rags to paper-mills that are not at the same time consignments of potential small-pox to the community possessing the mills. This statement is none the less true because it happens only occasionally that the mill operatives contract the disease. The women in the rag-rooms are exposed to the danger of contagion almost every working day of their lives, and the community is at the mercy of the chance which dooms or spares the rag-women. Safety for the community can be secured only in one way, namely, by the thorough disinfection of rags before they are allowed within its corporate limits."

Variola caused by Infected Paper Rags, by F. B. A. Lewis, M.D. (Horr), of Watertown, N. Y. *Boston Medical and Surgical Journal*, vol. i, 1875, p. 647:—"On the first appearance of these cases to be detailed, they were considered by me to be those of rotheln, as described by Drs. Cutting and Swan, but they terminated in an undoubted form of variola." Ten cases are referred to by the writer, and the symptoms described at length. The writer further adds,—“Recurring to the first cases, they are supposed to have been caused by exposure to twenty bales of rags which were brought from California, ten bales having been received January 28, and ten February 5. These rags were sorted by twenty-one girls in one large room, seven of whom were attacked at about the same date. The superintendent of the room stated to the writer that the rags were moist, and had a peculiarly disagreeable odor, and many bandages, poultices, some entire articles of underwear, stained as though from the persons of invalids, were found.”

“The writer has observed that the vessel bringing these rags to New York city was not quarantined; that the bales were stored with many others which were forwarded to the mills of another county, and, although made into paper, no complaint was entered. Some of the employés here who actually handled the rags were not affected, while others working on other material on the opposite side of the room succumbed to the disease; and even two or three who were in other parts of the mill, but



who came into the assorting-room on an errand, took the disease. About forty cases have occurred in all, and thirteen or fourteen have died."

Opinions of Medical Men. From *The Medical Record*, June 20, 1885. Rags and Infectious Diseases. Editorial:—"The opinion of these health officers, and of the best health authorities generally, is, that imported rags should sustain careful inspection, and, if need be, disinfection. The best method of securing a sanitary history of the rags—and that is what the ship should supply—have not been devised, and therefore some trouble must for the present ensue. It is much wiser and more economical meanwhile to be on the safe side, and Health Officer Smith will get the hearty support of the profession and the laity if he takes firm ground in defence of the public health. It should be remembered that cholera is not the only danger which we must avoid. Whether it has ever been imported in rags or not, other diseases almost as destructive have been so conveyed."

Letter from E. Hoffmann, Austrian delegate to the International Sanitary Conference at Rome, 1885, member of Committee on Disinfectants:

"AUGUST 11, 1885.

"VERY HONORED COLLEAGUE: In reply to your highly prized letter, which I received yesterday, I report as follows:

"I hold rags which come from regions infected with cholera exceedingly dangerous, not merely because they may be soiled with cholera defections, but especially because they hold in the interior of the bales the infectious material longer than might otherwise be possible, for the dejections, etc., dry out only slowly, and the warmth favors the growth of microscopic organisms. On the whole, there takes place in this respect the very same process which is also to be observed in single rags, where the infectious material is kept moist a longer time in the folds, or in places where it is more closely laid together, and keeps the microscopic organisms contained therein much longer in a condition to multiply.

"In Austria, whenever the cholera breaks out in another country, the importation of rags is imperatively forbidden. Special regulations about the disinfection of rags do not exist, and only general directions for disinfection are enforced.

"I myself would employ only heat (steam) and complete aeration. It is of the highest importance in this matter to see to it that only thoroughly dried rags are packed in bales and brought into trade. With reference to the so-called 'rag-sickness,'—which in my opinion is a form of anthrax, and which affects especially the workers in paper-factories who open bales of rags and perform the first work upon them, sorting and cutting the rags,—I have required that the rags, before their manufacture, should be treated with superheated steam, then spread upon a grating and thoroughly dried."

Dr. George M. Sternberg, whose researches and studies in relation to germ-producing diseases have secured him an enviable reputation both in this country and in Europe, writes as follows: "It is difficult to make a general rule which will be just to those engaged in importing rags, without taking any risk so far as the public health is concerned. But it seems to me that there will be less injustice in a rule to which no exceptions are made, than in leaving the matter to the individual judgment of the health officers of our several cities. \* \* \* I am satisfied that the below named infectious material could be transported across the Atlantic in bales of rags without any loss of specific infectious power, viz., arti-

cles infected by contact with patients having yellow fever, small-pox, or scarlet fever, or with the germs of anthrax (malignant pustule), symptomatic anthrax (black leg), pleuro-pneumonia of cattle, and tuberculosis. \* \* \* When we consider the degraded condition of the rag-picker in the populous cities of Europe and Asia, and the localities in which their collections are largely made, it seems to be beyond question that infectious material of various kinds must frequently find its way into the bale of rags which is shipped to this country. I am therefore in favor of disinfection of all rags by the very simple but effective method of subjecting them to superheated steam."

The health officer of Ypsilanti, Mich., in a report to the secretary of the State Board of Health of Michigan, says,—“Before closing this report, I would desire briefly to allude to the source of the small-pox in this city. In most all cases it has been directly traced to those engaged in picking over rags in our paper-mills. The larger portion of those rags, particularly the best linen ‘stock,’ are imported in bales from France, Italy, or Germany. One can easily imagine that we have here a never-failing source of contagion, and that these rags, collected from all sources—hospitals, pest-houses, etc.—form a germ from which many of our epidemics originate. \* \* \* Cannot some remedy be devised, or some means be introduced, to disinfect these rags previous to sending them on their mission of death and disease through the United States?”

This was written in 1876. It cannot therefore be claimed that this opinion is the result of recent discussions concerning old rags, or from “cholera scare.”

In reference to the last case of small-pox reported from Ypsilanti, the secretary of the Michigan State Board of Health says,—“It originated in the rag-room of one of the paper-mills, and proved fatal the third day after the eruption appeared. I am very confident that contagious diseases may be spread in this way. Scarlet fever is frequently reported in this office as contracted from old clothing disused for weeks or months, but previously in contact with the sick.”

If clothing that has been in contact with the sick may convey the contagion of scarlet fever after “weeks or months,” it is much more probable that this disease, or small-pox, the contagion of which may be carried thousands of miles, and infect months after it has been given off by its victim, may be communicated by the rags which are thrown out of the sick-room into the garbage barrel or into the street, and gathered by the rag-picker with as little scruple and care from the gutters that reek with filth as from the refuse from the residence of the rich.

Dr. T. C. Minor, whilom health officer of Cincinnati, in a letter addressed to the *Commercial Gazette* of that city, said,—“Nine tenths of the outbreaks of zymotic diseases in the United States may be tracked to the doors of the rag and old-clothes men; and the sooner the American people realize this fact the better for all concerned.”

It is generally understood that Dr. John C. Peters has given much attention to the history of cholera. When a reporter asked him recently

whether it was likely that cholera could be brought here in baled rags, he is reported to have said,—“I should be afraid of them. I should be afraid of those last Japanese rags that they are making such a fuss about, for, although there has been no recent outbreak of cholera in Japan, it prevailed there some years ago; and it is a matter of general knowledge that rags will retain the cholera germ for a long period of time. Of course they will not hold cholera as long as they will small-pox, but we don't want small-pox or any other infectious disease any more than we do cholera. Then, too, it must be borne in mind that even though rags may come from a port where cholera has not prevailed, that is not a guaranty that they do not contain the deadly germs, for people move about from place to place, and from country to country, carrying with them old clothing which afterwards go into rag bales. It is therefore quite possible for a family from a cholera district to go into a previously unaffected place, and if they do not develop the contagion there, to send it thence in the rag bale. It has been of frequent occurrence that cholera has been carried to far-away countries in old clothing.

“The history of the breaking out of cholera in Spain last year is interesting, and positively sustains the theory, or fact, rather,—for so it has come to be accepted,—that the disease is carried in old clothing. It all came from one family, that, trying to escape the rigid quarantine, shipped from Marseilles down to Algiers, and from there shipped to Alicante in Spain. Their clothing of course had not been disinfected, and shortly after their arrival the disease broke out in Alicante. It lingered there during the winter, and has since been doing deadly work.”

In compliance with the request of the surgeon-general of the United States Army, Dr. Sternberg gave the following opinion :

BALTIMORE, MD., March, 1885.

*To the Surgeon-General U. S. Army, Washington, D. C. :*

GENERAL: In compliance with instructions contained in a communication dated March 19, 1885, and with the request contained in the enclosed communication from the honorable secretary of the treasury, I have the honor to submit the following opinion :

My studies relating to disease-germs leave no doubt in my mind as to the possibility of the importation of the germs of cholera, malignant pustule, small-pox, and yellow fever in old rags, whether baled or otherwise.

The germs of malignant pustule (anthrax) may be preserved indefinitely without losing their virulence, and we have ample evidence that the germs of cholera, of small-pox, and yellow fever may be preserved in infected clothing or bedding for a considerable time, exactly how long a time has not been determined.

That such infected articles could be preserved in bales of rags can scarcely be questioned; and it seems apparent that they are likely to find their way into the rag-picker's collections during the epidemic prevalence of these diseases, especially in countries where there is no organized sanitary supervision.

Very respectfully,

Your obedient servant,

GEORGE M. STERNBERG,

*Major and Surgeon, U. S. A.*

*To the Editor of the "Evening Post.:"*

SIR: In the *Evening Post* of September 1 you state,—“There is no authentic case on record of cholera having been conveyed in rags, but great pains have been taken to alarm



the public through the telegraph and press." There is a case in the record of my memory as follows: In the summer of 1849 a whole family, somewhere in northern Indiana, died with cholera. The clothing of that family was packed late in the spring of 1850, and sent to some relatives in Castalia, O., who opened the box and used the clothing. This latter family was attacked with the disease, the first case there, and through them the cholera spread through that village and the surrounding country, and was very fatal.

S. BRUSH.

Canandaigua, N. Y., September 3, 1885.

Dr. L. A. Sayre, formerly resident physician of the city of New York, when asked what articles he was particularly suspicious of, is reported to have said,—“Well, more than anything else, the packed-up clothing of immigrants, and the rags that were brought from infected districts. That last, by the way, is a matter that should concern us very much about these days, if there are to be any importations from the neighborhood of Marseilles, Madrid, and other infected localities or ports where transshipments from such ports could be made. Not only would there be danger now, but for many months to come.”

*Revue d'Hygiene*, Paris, May 20, 1885, by Dr. G. Pouchet, page 392.—“When we think of the varieties of merchandise coming from abroad, and their more or less prolonged stay in the warehouses, or the masses, often considerable, accumulated in damp places, which favor the development of inferior organisms, we have reason to be surprised that their immediate use does not more frequently occasion contagious diseases or local troubles, such as phlegmons, an example of which I saw in a workman, who, having an excoriation of his hand, wrapped the injured part in a piece of rag, apparently clean. Our colleague, Dr. Napias, related, in his excellent *Manuel d'Hygiene Industrielle*, epidemics of small-pox breaking out among the workers manipulating old rags.”

*British Medical Journal*, vol. ii, 1884, page 629, September 27, 1884. Imperial Board of Health, July 29, 1884.—“Concerning the case quoted by Professor Leyden, Professor Hirsch said, that in the town of Mühlhausen, in Thuringia, there were nine cases of cholera, four of them proving fatal, in the cholera epidemic of 1873, all of which, with the exception of one case, belonged to one house. The house was inhabited by six families, numbering twenty-three persons, three of the families, numbering eleven, inhabiting the basement floor. Behind the house was a drain of a closet which was used only by the inhabitants of the basement, other water-closets existing for the inhabitants of the lower stories. The first case, which took place on August 26, was that of a woman who had come a few weeks before to Mühlhausen from St. Louis, in the United States of America, *via* New York, Hamburg, and Bremen, but had only received the things brought with her from America about the beginning of August. Among these effects were some soiled linen which she sent to be washed, and some confectionery which she and her sister, in whose house she was living, partook of. A few days afterward the new-comer was attacked with cholera; then her sister; her child and her grandmother also had severe attacks of diarrhœa; and soon afterward cases of cholera occurred among the other families

inhabiting the basement,—so that, out of the eleven persons inhabiting the basement, only two escaped the disease, and four died of it; while of four among the inhabitants of the upper stories, who had afforded the sick persons assistance, and also took charge of the old woman and the child, who had become ill, not one case of cholera occurred. That at the time when the effects left St. Louis cholera had been raging especially severely, in the quarter of the town, too, from which they came, has been accurately proved. The appearance of cholera in that house in Mühlhausen, where there had been no case till then, after the arrival of the luggage, induces the reporter of the case to believe that the specific poison of the disease was introduced with the baggage, and that the farther spread of the disease among those inhabitants of the basement who had not come in contact with the things was explained as infection from the closet used in common by the inhabitants of the basement, the dejecta of the first patient having been thrown into it.”

Dr. Hirsch said,—“An interval of from four to six weeks between one case of cholera and the outbreak of an epidemic caused by personal effects was completely reconcilable with Dr. Koch’s views.”

Dr. Koch possessed dried anthrax material which was still efficacious after twelve years. In small-pox, infection sometimes took place after a year, or longer, and the vaccine could be preserved in a dry state for years. Linen packed together could still remain damp after the lapse of some weeks, and thus contain vital comma-bacilli.

*Annales d’Hygiène Publique*, March, 1885. By Professor Brouardel. Preservation of Europe from Exotic Diseases. Extract, page 241. “The linen which has been polluted by the dejecta of cholera patients is a powerful agent of propagations, sometimes direct when by the contact of the hands one carries the germ to the food, when one breathes the effluvia, or indirect when the people drink the water below the wash-houses. ‘In order that you may understand the importance of this question, let us cite two examples:’ page 142. “The epidemic of Yport: The sailors arriving from Newfoundland, absolutely healthy, debarked at Hetta, where the cholera was raging. Some died. They decided to return by the railroad to their native country, Fécamp and Yport. One of them died at Parascon; his trunk continued the route, remained eight days on order at Paris, went to Yport, an old woman opened it, emptied it, and washed the clothes. She died two days after, and created a focus far from all communication with any other centre. The soiled linen had been the only means of contact.”

#### RAG-PICKERS DISEASE.

*Extracts from Foreign and Home Journals.* (*Annales d’Hygiène Publique*, 1879, vol. ii, page 480.) The physicians of lower Austria have observed recently a disease, the nature of which remains unknown, that they have only met in the paper-factories, and which they call the rag-pickers’ disease (*Die Handernkrankheit*). The disease commences

with weakness, anorexia, insomnia, vomiting, sensation of weight in the epigastrium the second day, sometimes the third; one can see cyanosis of the lips, cheeks, nails, cold sweats, œdema of the lungs, no disturbance of the brain. Generally death is easy, excepting in cases where there is pulmonary stasis. No abdominal symptoms, no albumen in the urine. On necropsy one finds various lesions of the lungs without special character.

This is the disease Dr. Hoffmann, the Austrian delegate to the Rome International Sanitary Conference, refers to on another page as "rag-sickness," and which he believes to be a "form of anthrax."

Extracts from the report of Dr. Bristow, taken from the eighth report of the medical officer of the Privy Council, pages 206-'7: "Mr. Barnard, upon opening a bag of rags, noticed a disagreeable odor, and fourteen days (or thereabouts) after was seized with small-pox. He recognized the same odor while the scabs were falling off. No small-pox in the vicinity previously. Saunders (a female rag-sorter) took small-pox from Temple mills, Marlow; four others had it at nearly the same time. All five were engaged on dirty London rags. She was attacked in two weeks. No small-pox in the village at the time. Mrs. Hays says while cutting up rags she recognized the smell of small-pox, and two or three weeks afterward she took the disease. She claims that the rags were from Tunbridge Wells, where small-pox was prevailing at the time. There was no small-pox in her neighborhood at the time. Mrs. Holland had small-pox, which she attributed to some London seconds she had been cutting up. Eight other cases broke out subsequently in the mill. There was in the neighborhood one Henry Styles, a carrier, who had the disease previously; he died of it a week or two before she took it, but he lived three fourths of a mile away, and had no communication with her."

Surgeon-General Murray, who served many years in India and made extensive researches, states that according to returns received there was an almost unanimous belief in the communicability of cholera. Those who believed in a spread from person to person amounted to 75 per cent. of the whole number; from place to place, 85 per cent.; by evacuations, 92 per cent.; and by clothing, 98 per cent.<sup>1</sup>

Dr. I. H. Taylor, chairman of this committee, when the "preliminary report" was under discussion at the meeting in Washington, says,—"Two distinct outbreaks of small-pox near Spring Mills occurred among the operators in one of the manufacturing establishments there, from baled rags. The rags came from New York."<sup>2</sup>

Professor Jos. H. Raymond, late health commissioner of Brooklyn (and member of this committee), has furnished your reporter with the following analysis of evidence in response to inquiries made in the exercise of his office, which was at hand last year, but prohibited by the "previous question" to refer back the preliminary report.

<sup>1</sup>Went's *Asiatic Cholera*, p. 206.

<sup>2</sup>*Public Health*, vol. xi, p. 377.



"Summary of replies to circular letter addressed to Boards of Health and Paper Mills: Boards of health responded—American, 28; foreign, 10;—total, 38. Number of boards of health that have known of contagious diseases from rags—American, 14; foreign, 5;—total, 19. Number of boards of health not knowing of contagious diseases from rags—American, 14; foreign, 5;—total, 19.

"Nature of contagious diseases above referred to: Small-pox, 71 cases and 24 epidemics; cholera, 1 case; scarlet fever, 3 cases and 2 epidemics; typhoid fever, 1 case.

"Health officer of Yonkers believes scarlatina, measles, and whooping-cough may be contracted from rags.

"Health officer of Hamburg believes that small-pox, scarlet fever, typhoid fever, cholera, yellow fever, and glanders may be contracted from rags, and reports case of malignant pustule and several cases of small-pox.

"The health boards are unanimous in their belief in the danger of infection from rags, and the necessity of disinfection. Those who do not report cases are mainly from places where there are no paper-mills.

"Number of paper-mills that responded to circular for information:

	American.	Foreign.	Total.
Number of paper-mills that responded to circular for information,	84	27	111
Number that have known of contagious diseases in paper-mills,	24	3	
"    "    have not known of contagious diseases in paper-mills,	60	24	
"    "    believe that rags may carry infection,	35	10	
"    "    believe in disinfection of rags,	16	1	
"    "    do not answer as to disinfection of rags,	33	25	
The disease reported is invariably small-pox.			

"Of those who report contagious diseases in paper-mills many do not believe it attributable to rags; others report that it was due to domestic rags. The foreign mills, with one exception, report the disease as occurring in other mills than their own. Several believe that contagion can be carried by second-hand clothing and the baggage of emigrants. Six believe the danger from rags is very small and much exaggerated. Several believe that domestic rags may infect, but are very sure there is no danger in foreign rags."

The evidence now adduced, though far from being all that could be, in favor of the propagation of infectious diseases by rags and their congeners, is deemed to be sufficient to satisfy the scruples of all persons, professional or otherwise, who do not allow other interests than the public health to sway their opinions. It would be a waste of effort to undertake to satisfy such persons, and they may well be dismissed from present consideration with the words of the eminent Dr. Richter, of Germany, whose voice was long since raised against rags as the fruitful source of contagious disease, who says,—“When man’s own interests are at stake, he does not care at all for his fellow-beings, whether in adversity or prosperity, and for a farthing he will put all the people’s health in jeopardy.”

It is conclusively shown that cholera, in proportion to its prevalence outside of India, is no less liable to propagation by rags and clothing than small-pox and other infectious diseases. "But," observes Dr. H. B. Baker, secretary of the State Board of Health of Michigan, in a recent communication to the editor of *The Sanitarian* (vol. xvii, p. 61), "small-pox is not the disease most to be dreaded by our people; and, judging by past experience, cholera is of small consequence compared with those diseases which, when once introduced, tend more strongly than do those diseases to remain, and continue to swell the death-rates. In the year 1880 small-pox is reported to have killed only 871 people in the United States, while scarlet fever killed 16,416, and diphtheria killed 38,398.

"In Michigan, in a long term of years, the mortality from scarlet fever is about eight times, and from diphtheria about sixteen times, greater than from small-pox. In Europe, also, the mortality from scarlet fever and diphtheria is large compared with that from small-pox. Taking up at random monthly reports from the province of Madrid, Spain, I find that in August, 1883, the deaths from diphtheria were 83; scarlet fever, 18; small-pox, 24. August, 1884, deaths from diphtheria in the province of Madrid, Spain, 120; scarlet fever, 20; small-pox, 9. December, 1884, diphtheria, 118; scarlet fever, 8; small-pox, 19. Pursuing the same course with Copenhagen, Denmark, I find that in October, 1885, there were, of diphtheria, 455 cases; of scarlet fever, 526 cases; and of small-pox, 16 cases. In November, 1885, of diphtheria, 536 cases; of scarlet fever, 547 cases; of small-pox, 7 cases. In December, 1885, there were, of diphtheria, 633 cases; of scarlet fever, 595 cases; and only 28 of small-pox. In the next month, of diphtheria there were 703 cases; of scarlet fever, 624 cases; and of small-pox, 5 cases.

"I do not suppose that many unprejudiced persons will now dispute that diphtheria and scarlet fever are conveyed, among other means, by clothing; and that imported rags, coming as they do from so many places, from the homes of the people, where those diseases are constantly occurring, can be the cause of outbreaks in this country. The presumption is, that in every large lot of rags, gathered as they are, some will be likely to be infected with the causes of those diseases, because the diseases are so widely distributed and are so constant. There is not a country in Europe free from them any week of the year, and there is not a large city that is now ever free from them. In the table in *The Sanitarian*, June, 1886, page 567, you show that diphtheria was present in forty-seven of the cities of Europe during January, February, and March, 1886, and I can add Madrid, Rome, and Copenhagen. Your table includes all of the countries which I have previously named, also Ireland, Sweden, Norway, and the Netherlands. Scarlet fever, according to your table, was present in forty-four of those cities, to which also can be added Madrid, Rome, and Copenhagen. In the March number, 1885, you show that diphtheria and scarlet fever were present during the year 1884 in forty-eight of the large cities of Europe, and the figures are so

large as to make it certain that those diseases are constantly making havoc among the people.

“Cases of small-pox in this country have been traced to rags, but I do not know that any attempt has been made to trace diphtheria and scarlet fever to them; yet I consider the danger of our getting diphtheria and scarlet fever from such rags much greater than of small-pox. Small-pox is more easily traced than are the other diseases; it is never so subtle and mysterious, while, strange to say, it yet causes greater popular apprehension, which makes a discovery of the source of contagium more certain. We know that immigrants from Europe having diphtheria and scarlet fever, or carrying the contagium in their clothes, land in New York every year. Speaking of scarlet fever, the Fifth Annual Report of the State Board of Health of New York (page 5) says that the cities of New York and Brooklyn, ‘as might be expected from their constant influx of immigrants,’ bear the principal brunt. But such diseases spread so easily that they are not confined to either of those cities: they spread throughout nearly this entire country.

“In considering this question of disinfecting imported rags, it is well, then, to remember these points:

“1. Diphtheria and scarlet fever are very much more destructive everywhere than is small-pox.

“2. Diphtheria and scarlet fever are never absent from any European country.

“3. Rags collected from the homes of the people of Europe are more likely to convey diphtheria and scarlet fever than small-pox.

“4. The sooner public attention is attracted to the many ways in which those diseases—scarlet fever and diphtheria—which actually destroy our people by the thousands, are introduced and spread, especially throughout the Northern states, the sooner will it become practicable to prevent the introduction of those diseases.

“5. If United States consuls could have, as we have, through our system of exchanges, the knowledge relative to the presence of the really dangerous diseases in each of the foreign cities and countries, it would probably be impossible for them to truthfully give such a certificate as is required by the resolution of the New York Chamber of Commerce. The last clause of the first resolution adopted by the chamber should then be operative. It reads as follows: ‘In the absence of such certificate, rags coming from a port or country claimed to be free from such diseases shall be disinfected on arrival.’”

With these views the undersigned cordially agree, and therefore respectfully recommend so much of the preliminary report of the committee last year as is hereto annexed, marked A; and also recommend as an appendix to this report the “Résumé” of the subject, by Dr. Wm. M. Smith, health officer of the port of New York, marked B.



## (A)

The Special Committee, to which was referred the resolutions of the Philadelphia Board of Health touching the importation of infected rags, begs leave to submit the following preliminary report:

*Whereas*, It is an admitted fact that the importation of rags is a prolific source of the spread of infectious disease, and that the seaboard cities which are ports of entry are the gateways through which this infection enters and is distributed throughout various sections of the country; and,

*Whereas*, There are grave doubts as to the efficacy of the methods of disinfection used abroad;—therefore,

*Resolved*, That it is the judgment of the American Public Health Association that all health authorities having jurisdiction over matters connected with maritime sanitation owe it as a duty to the general public to adopt such systems of disinfection as will thoroughly destroy all disease-bearing germs before the rags are permitted to be distributed for manufacturing purposes. If it proves to be impracticable to disinfect them, it is recommended the disinfection may be commenced in quarantine sufficient to insure safety in transportation, to be completed in the manufacturing establishment by such methods as the health authorities may prescribe.<sup>1</sup>

(Signed)

J. HOWARD TAYLOR.

A. N. BELL.

H. B. HORLBECK.

Washington, December 11, 1885.

A. N. BELL, M. D.,

*Chairman.*

HENRY B. BAKER, M. D.,

*Secretary of State Board of Health of Michigan.*

JOSEPH HOLT, M. D.,

*President of State Board of Health of Louisiana.*

JOSEPH H. RAYMOND, M. D.,

*Professor of Physiology and Sanitary Science Long Island College Hospital,  
and late Health Commissioner of Brooklyn.*

H. B. HORLBECK, M. D.,

*Health Officer of Charleston, S. C.*

J. HOWARD TAYLOR, M. D.,

*Medical Inspector, Health Department of Philadelphia.*

C. W. CHANCELLOR, M. D.,

*Secretary of State Board of Health of Maryland.*<sup>2</sup>

Toronto, October 5, 1886.

## (B)

## RÉSUMÉ.

## SANITARY AND HEALTH ORGANIZATIONS.

## SUMMARY

Of reports and recommendations in relation to and expressive of the danger of contagious diseases from rags, contained in the brief of the health officer submitted to the Committee of the Chamber of Commerce, appointed to investigate the rules and regulations of the health officer of the port in relation to the disinfection of rags:

<sup>1</sup> The last clause of this resolution, beginning with "If it proves," was added by the Executive Committee. They also struck out the word "uniform" before the word "system" in the third line, and the resolution as amended was adopted by the Association.

<sup>2</sup> Dr. Chancellor, being in Europe, has not seen this report, but the chairman of the committee feels so confident of his approval from previous communication with him, that he has assumed the responsibility of adding Dr. Chancellor's name.

1. The Conference of the State Boards of Health at Washington, D. C., in 1884.
2. The Conference of the same body in 1885.
3. The Treasury Department of the United States adopted and enforced the recommendation of the conference of 1884, until June 10, 1885.
4. The Ordinance of the Boston Board of Health, that requires the disinfection at that port of all rags that enter.
5. The Recommendation of the Fifth Avenue Hotel Conference, May 23, 1885.
6. The State Sanitary Convention held at Philadelphia May 13, 1886.
7. The Sanitary Congress of the Hague of 1884, which pronounced rags "a danger national and international."

#### MEDICAL JOURNALS AND OFFICIAL REPORTS

That refer to cases of contagious or infectious diseases communicated by rags, or that refer to the danger from them:

1. State Board of Health of Michigan, 1882, p. 393.
2. Sixth Annual Report of State Board of Health, Connecticut, p. 22.
3. Secretary's report in same, p. 225.
4. State Board of Health, Michigan, 1881; also, p. 295 of same.
5. Fifth Annual Report of Massachusetts State Board of Health, 1877, p. 548.
6. State Board of Health of Connecticut, Fourth Annual Report, 1881.
7. State Board of Health of Michigan, p. LXII.
8. Annual Report State Board of Health, 1882, pp. 53, 58.
9. Report of Special Inspector W. B. Atkinson, M. D., to Secretary of State Board of Health of Pennsylvania.
10. British Medical Journal of May 11, 1878, p. 686.
11. British Medical Journal, Vol. I, p. 863.
12. British Medical Journal of July 3, 1880, Vol. II.
13. British Medical Journal of January 20, 1883.
14. Annual Report of Local Government Board of England, 1883, 1884.
15. The British Medical Journal, August 4, 1883.
16. The British Medical Journal, May 2, 1885.
17. National Board of Health Bulletin, Vol. I, No. 44.
18. Massachusetts State Board of Health, 1873, p. 463, reporting 192 cases of small-pox originating at paper-mills of that state in 1872 and February of 1873.
19. Second Annual Report of Wisconsin State Board of Health for 1877, pp. 140, 141. Also supplementary report of same volume, p. 95.
20. Boston Medical & Surgical Journal, 1875, Vol. II, p. 647.
21. In answer to ex-Health Commissioner J. H. Raymond's inquiry, 19 boards of health replied that they had known of 71 cases of small-pox, and therefrom 24 epidemics of that disease, 1 case of cholera, and 2 epidemics of scarlet fever from rags.
22. British Medical Journal, Vol. II, 1884, p. 629. (Cholera in Germany by clothing from the United States.)
23. New York Journal, August, 1885. Account of 17 workmen who took cholera from rags, 11 of whom died.
24. New York Medical Record, June 20, 1885.
25. British Medical Journal of August 25, 1883, p. 397, refers to importation of disease by rags.
26. August 15, 1883, House of Commons, member of, called attention of Local Government Board to small-pox imported by rags.
27. British Medical Journal of 1880, Vol. I, p. 952, reports epidemics of small-pox from rags that had been on the place six months.
28. "Annal d'Hygiene Publique," 1879, Vol. II, p. 480, describes the "rag-pickers' disease," prevalent in lower Austria.
29. Eighth Report of Medical Officer of Privy Council, England, refers to numerous cases of small-pox from rags among operatives of paper-mills.
30. Revue d'Hygiene of May 20, 1885.

31. In Manual d'Hygiene Industrielle, Dr. Napias relates epidemics of small-pox among workers in old rags.

32. A French decree, March 15, 1885, compelled the disinfection of rags and paper rags, and the importation was compelled to pass through four ports where disinfection was provided.

33. M. Lecourteux and Garnier, large manufacturers in France, in St. Oberkampf, steam their rags in copper boilers before distributing to workmen.

34. The New York Times, February 6, 1886, reports cases of small-pox originating in handling rags in a paper-mill (Adams's).

#### OPINIONS OF MEDICAL MEN.

1. Dr. Griswold, of Connecticut, reports six malignant cases of scarlet fever (four fatal) conveyed to patients through rags.

2. The secretary of the State Board of Health, Michigan.

3. The health officer of Ypsilanti, Michigan.

4. Dr. T. C. Minor, formerly health officer, Cincinnati.

5. Dr. E. Hoffmann, Austrian delegate to International Sanitary Conference at Rome.

6. Dr. George M. Sternberg, U. S. A.

7. Dr. Sayre, of New York city, and 200 physicians of the city of Brooklyn, advise that rags be disinfected.

8. Four hundred physicians of New York city urge that the health officer of New York thoroughly purify such merchandise as rags on arrival at this port.

9. Dr. Ruijsch, of The Hague, declares them a danger, national and international.

10. Dr. Pouchet, M. Vallin, M. Olliver, M. Gabriel, and M. Pasteur, eminent French authorities, speak of the danger of disease from rags, or discuss the best means of disinfecting them.

#### SUMMARY OF CASES.

1. A rag-picker from Amsterdam introduced cholera into the city of Tilbourg.

2. At Dresden a rag-picker was the first victim in that Commune.

3. At Mearsen the first one attacked with cholera was a rag-picker.

4. At Wormerveer, in 1886, rags communicated typhus fever to various people.

5. In the Canton of Solothern, 17 workmen, of whom 11 died, were seized with cholera, who were engaged among rags in the paper-mills. There was no cholera within the canton, and the rags came from a cholera district.

6. A sailor died of cholera in Europe; his clothing sent to Maine (U. S.) communicated the disease.

7. Cholera was introduced at Carthage, O., Crow Run, Minn., and Yankton, Dak., by the baggage of immigrants.

8. Nine cases of cholera, four of which were fatal, occurred at Mühlhausen (Thuringia) in 1873, was introduced by clothing brought by a woman from St. Louis, in the United States, *via* Hamburg and Bremen. Rags in bale have much better condition for preserving contagion than baggage.

#### SUMMARY OF CASES OF SMALL-POX, &C.

1. The Report of the State Board of Health of Massachusetts, 1873, shows that 192 cases of small-pox originated in the paper-mills of that state in 1872 and February of 1883.

There is really little difference of opinion among medical men as to rags being the most filthy of commercial products, and dangerous to human life and health.

The authorities referred to cover reports of hundreds of cases and numerous epidemics of contagious diseases, both in Europe and America, that have been communicated by rags.

It is not that disinfection of rags is not necessary, but how to do it effectually and economically.

It has been and is being done by the sulphur process *before* bailing. It has been and is being done by boiling *before* bailing. Fifteen sixteenths of the 160,000 bales imported



at New York during the year past have been disinfected by that process. This process, however, has been greatly discredited by reports of inefficiency in its management.

It has been and is being done by super-heated steam *after* bailing.

The process whereby rags in bale may be disinfected by dioxide of sulphur in vacuum was approved by the health officer at New York.

The first mentioned process has been discredited to some extent by the representations as to the inefficiency of the management.

The second has been and is approved, after numerous experiments by the most intelligent experts and medical authorities.

The third of a series of experiments has proved to be efficient in destroying the disease-germs known and believed to be the cause of certain diseases of the human race.

#### INFECTED AND NON-INFECTED RAGS.

The effort to distinguish rags that are dangerous from those that are not is not only difficult, but often impossible. Transshipments are too frequent; the temptation to deceive the health authorities too great. The localities in which contagious diseases exist are often not reported. Some of the most destructive to human life, such as small-pox and typhus, always prevail in every country to a greater or less extent. If prohibition was the rule in such conditions, a large portion of every country would be prevented from shipping rags.

Disinfection of all rags would be far more satisfactory. This conclusion is arrived at by many authorities, among whom may be mentioned Dr. George M. Sternberg, Dr. J. H. Hill, inspector on consular staff at London, the United States consul at Bristol (England), and the editor of the *London Lancet*.

The assumption that domestic rags alone communicate disease is preposterous, and that manufacturers have never known any case of disease caused by foreign rags is incredible. Foreign rags are far more dangerous than domestic, because contagious diseases prevail to a far greater extent among the crowded populations of the Old World. London alone had more cases of small-pox in 1884 and 1885 than occurred in the whole United States during the same period. Italy at this time is scourged with small-pox to an unusual degree. The same may be said of southern France.

The evidence that the contagion of cholera, small-pox, and other diseases may be vitalized by contact with persons months after it is communicated to textile fabrics, such as rags and clothing, is voluminous.

There is no doubt that domestic rags are a source of danger, and that they should be disinfected; but because they are not is no reason why the danger from foreign rags should not be removed.

WM. M. SMITH, M. D., *Health Officer, Port of New York.*

(C)

#### DR. STERNBERG'S LETTER.

[The following letter was transmitted to the secretary by the chairman of the committee, Dr. A. N. Bell, with an accompanying letter from Dr. J. H. Raymond asking that the communication of Dr. Sternberg be published in connection with the report of the committee. A copy of Dr. Sternberg's letter was submitted to each member of the committee, and a majority—Drs. J. Howard Taylor, H. B. Horlbeck, Joseph H. Raymond, and Joseph Holt—asked that it be published with the report presented at the Toronto meeting. The question of so publishing was submitted to the Executive Committee, and a vote in the affirmative was received.]—SECRETARY.

JOHNS HOPKINS UNIVERSITY,  
BALTIMORE, MD., Dec. 22, 1886.

DEAR DR. RAYMOND: I am much obliged to you for sending me the proof of the Report of Committee on the Disinfection of Rags, and gladly

avail myself of the opportunity you give me for placing on record my most recent conclusions with reference to the necessity for disinfecting old rags imported into this country. I had intended to take part in the discussion of this report at the Toronto meeting of the American Public Health Association; but circumstances prevented me from being present at the evening session when this report was read and discussed.

I find that I am quoted quite extensively in the report; and I think it proper that I should state my present views, as I am not by any means as positive with reference to the necessity for disinfecting *all* rags as I was two years ago. I have since had an opportunity to make a personal inspection of the large establishments in several European cities where rags are baled and shipped to this country. At the request of Dr. William Smith, health officer of New York, I made inspections at Ghent, Brussels, Berlin, and Stettin. I also obtained reliable information as to the methods pursued in Hamburg and other German ports from which rags are shipped to this country.

I had previously supposed that rags from ports in southern Europe, where cholera was prevalent, were liable to be shipped from any of these ports. But all of the merchants with whom I conversed assured me that this could never occur on account of the low price of rags as compared with the cost of land transportation. As a matter of fact, rags sent to each shipping-port can only be collected within a limited area, the boundaries of which depend upon cheap transportation facilities, by canals, rivers, etc.

Again: I learned that all rags shipped to this country are first sent to large warehouses in the shipping ports, where they remain for a longer or shorter time, often for many months, usually loosely piled up in open bins. These warehouses of the rag-merchants are in populous cities, and it is evident that the first danger of infection is incurred by those who handle the rags for the purpose of sorting and baling them, and by the citizens of the cities in which the warehouses are located. These cities have their health officials, who naturally have an eye on the warehouses in question, and we would expect to see some restrictions placed upon the business of these rag-merchants if experience had demonstrated that their establishments were dangerous to the public health. I could not learn that, under ordinary circumstances and in the absence of a prevailing epidemic, any restrictions were placed upon this business, or that any were considered necessary.

The fact that rags shipped to America are carefully sorted in these large warehouses in populous cities, by women and children who come to the warehouse every morning and return to their homes when their day's work is done, gives us data available for estimating, in a general way, the danger of handling rags. To a certain extent these people serve as a test of the possible infectious character of the rags which they handle. The outbreak of any epidemic due to their occupation could scarcely fail to attract the attention of the local health authorities, and to lead to official inquiry and the carrying out of the necessary measures of

disinfection, etc., for their own protection. I would not be understood as advocating a reliance upon the test furnished by the rag-sorters of the shipping ports, and the vigilance of the local sanitary authorities during the prevalence of any epidemic disease in Europe. Information might reach us too late, and the very rags which had given rise to an outbreak of disease among these rag-sorters, or their associates, might be opened at one of our paper-mills before we had received information of the outbreak at the shipping point.

It is, however, apparent that our danger is less than that incurred at the shipping point, and that to a certain extent the sanitary condition of these rag-sorters may serve us as a test of the danger we incur in receiving the rags which have passed through their hands. I made inquiries with reference to the general health of these rag-sorters, and also endeavored to ascertain if any outbreaks of infectious disease among them could be traced to their occupation. So far as I could judge from a personal inspection, and from the information furnished me, they presented no evidence of ill-health due to their occupation; and I was not able to obtain any facts bearing upon the transmission of infectious diseases to these people in the pursuit of their daily avocation. I do not, however, attach much importance to the negative results which attended my own inquiries. My informants were, for the most part, those engaged in the business of collecting and shipping rags, and due allowance must be made for the fact that they were interested parties, and that they were not necessarily well informed as to the sanitary history of their employés.

I attach more importance to the fact that the local sanitary authorities do not demand the disinfection of rags brought to these warehouses, and apparently do not consider them a serious element of danger.

The report of the committee on the disinfection of rags, which is before me, is extremely valuable for the reason that it contains the available positive evidence relating to the transmission of infectious diseases by old rags. So long as we had no collections or data of this character to guide us, it was necessary to be guided by *a priori* arguments based upon our knowledge of the nature of infectious material, and known facts relating to the ordinary modes in which these diseases are communicated. My letter to the surgeon-general of the army, written in March, 1885, which is quoted in full in the report of the committee, contains an opinion based upon such data alone. I see no reason to change my opinion as therein stated. Indeed, it receives support from the record of facts collected by the committee on the disinfection of rags. But the question is not simply as to the possibility of the transmission of the diseases mentioned, but also as to the frequency of their transmission in this way, and as to what action we shall take in view of the facts regarded in a broad way, and taking into consideration sanitary interests, commercial interests, the practicability of proposed methods of disinfection, other possible measures of prophylaxis, etc.

I believe that there is a unanimity of opinion among sanitarians in this country and in Europe as regards the necessity of excluding or disinfect-



ing all rags collected in or shipped from countries in which cholera is prevailing ; and the same may be said of yellow fever. We cannot afford to take any chances with these devastating, pestilential diseases ; for we have ample evidence that they may be communicated by the soiled clothing of the sick, or that such infected clothing is dangerous for a considerable period of time. Notwithstanding the limited number of observations relating to the transmission of these diseases through the medium of old rags, no one would be hardy enough to recommend their unrestricted admission from countries in which these diseases are prevailing. The question here is between disinfection and total exclusion. So far as cholera is concerned, the nations of Europe have for the most part decided in favor of the exclusion of rags from countries known to be infected, or believed to be dangerous. This is perhaps the wisest course, as it is certainly the safest. But if it is decided to disinfect, we must answer the questions as to where and how this shall be done. My colleagues on the Committee on Disinfectants of the International Sanitary Conference of Rome (1885) were unanimous in regarding steam under pressure as the only reliable agent for the accomplishment of this purpose. My own experiments, made at the request of Dr. Smith, health officer of New York, in the spring of 1885, had convinced me of the practicability of disinfecting rags in the bale by injecting steam under a high pressure through a number of perforated metal screws, *on condition that the bale was placed in a steam-tight receptacle during the operation*. As to the practicability of so disinfecting rags in the bale, from an economic point of view, I have never given an opinion, because I have not had the necessary data upon which to form one. The rag-merchants in Europe at the time of my visit insisted with great unanimity that the process injured their rags, and seriously impaired their market value. It is a question, also, whether in practice it is possible to keep those who are entrusted with the application of the method up to the conditions established by the first experimental test. If the bale is not enclosed in a steam-tight receptacle, the steam from the perforated screws will find the shortest and easiest way out, and certain portions of the bale may escape complete disinfection. Evidently it would be a much simpler matter to disinfect rags before they are baled, in a suitably constructed chamber into which steam could be admitted at any desired pressure. This would involve their disinfection at the shipping port. I was informed by the large rag-merchants in Berlin and other cities which I visited that they would gladly construct a suitable apparatus if they knew exactly what we required, and if they had any assurance that we had adopted a settled policy. But I should not place any great dependence upon disinfection practised abroad, unless we could have a reliable inspector upon the spot. Disinfection with sulphurous-acid gas, as now practised at the shipping ports, which I had an opportunity to visit, I look upon as a farce. It is practised simply for the purpose of escaping the steam disinfection process at this end of the line, and is looked upon by the rag-dealers and health authorities of European cities as un-

necessary and inefficient. The latter it certainly is, as I saw it practised, and the inspectors appointed by our government to see that it was done in accordance with prescribed regulations had no more confidence in the utility of the procedure than I had. Taking all of the circumstances into consideration, I think it will be prudent for us in future to adopt the policy of England and of the leading nations of the continent of Europe, and to exclude rags from cholera-infected countries, rather than to trust to their disinfection either before shipment or at the port of arrival. The evidence collected by the Committee on the Disinfection of Rags shows that the disease which has been most frequently transmitted by this medium is small-pox. The question whether we, as sanitarians, shall demand the disinfection of all rags imported into this country, must be decided with reference to this disease. For if we leave out of consideration the widely extending pestilential diseases already considered—cholera and yellow fever—we have no evidence upon which to justify a demand for the disinfection of all rags except that which relates to small-pox. It is true that anthrax has been communicated to the employés of paper-mills in Austria through the medium of rags; but our danger from this and other diseases which depend upon inoculation—*e. g.*, syphilis—is hardly worthy of consideration. At the most, an individual may occasionally suffer from one of these diseases as a result of his occupation; but the risk taken by those occupied in paper-mills of suffering accidents of this kind is probably less than the risk of physical injury taken by operatives in mills, by railroad employés, and mechanics generally. We must deplore these accidents to individuals, but we are hardly justified in interfering with the branch of industry with which they are concerned upon such grounds. It is only when the sanitary interests of the community and of the general public are involved that we are justified in recommending general measures of prevention. As sanitarians, but more especially as humanitarians, we should do everything in our power to reduce the mortality from accidental causes in factories, mines, etc., by insisting upon such safeguards as science and experience suggest. But it seems to me that our functions cease here. Employers should be held to a strict accountability that all proper precautions are taken for the protection of the lives and health of their employés. Their responsibility should be established by legal enactments in the several states, and specific regulations should be devised for the protection of all workmen who are engaged in occupations in which they are especially liable to accidental injury, or to impairment of their general health.

Returning to the evidence contained in the report before me relating to the transmission of small-pox, I should say that this evidence is ample to justify the demand that all rags shall be disinfected upon their arrival at our ports, if *there is no other and simpler method of accomplishing the same end*,—*i. e.*, the protection of the employés of paper-mills and the general public from this disease. But, fortunately, we have other means of protection against the disease in question. A properly vaccinated community is practically safe from the ravages of small-pox, and it is

generally admitted that the occasional outbreak of local epidemics of this disease is due to neglect of this precious means of prophylaxis.

It seems to me that in view of the data collected by the Committee on the Disinfection of Rags, it is incumbent upon us as sanitarians to insist upon the proper protection of all those who are brought by their occupation in contact with old rags. If this is done, the danger will be reduced to a minimum; and if the community is fully protected in the same way, as is the case in Germany, for example, there will be no good reason for disinfecting rags in the bale.

I take it for granted that the virus of small-pox, anthrax, or syphilis, attached to old rags, is out of the way of doing harm so long as these old rags are packed away in a bale, and that the danger from baled rags *in transit* is hardly worthy of consideration. But if a bale as a package of merchandise is considered dangerous, it could easily be disinfected externally by placing it in a proper receptacle, and subjecting it to the action of steam at a temperature of 230°-250°. Such external disinfection of bales should be practised when there is any reason to suppose that they may have become infected *in transit*, by passing through sea-port cities, or by being transported on ships, infected with cholera, yellow fever, small-pox, or any other infectious disease. This would not be expensive, and certainly would not materially injure the rags.

Finally, I would say that I consider it *desirable* that all old rags should be disinfected by steam and then thoroughly dried before they are packed in bales. This should be done as soon as practicable after they are received from the collectors at the storage warehouses, whether in this country or abroad. During the prevalence of cholera in Europe I would exclude all old rags shipped from ports known to be infected, or in direct communication with infected places.

I would *require* all rags shipped from a healthy port during the prevalence of cholera in Europe to be disinfected by steam before they were baled for shipment.

In the absence of any prevailing epidemic I would not treat baled rags differently from other merchandise. If for any reason the health officer at the port of arrival considers such merchandise dangerous, it is evidently his duty to disinfect it. This can be done most effectually by steam.

Inasmuch as I have been largely quoted in the report of the Committee on Disinfecting Rags, I think it desirable and proper that my present views upon the subject, as embodied in this letter, may be published in connection with your report.

Very sincerely yours,

(Signed)

GEORGE M. STERNBERG.



## XX.

### REPORT OF THE COMMITTEE ON DISINFECTANTS FOR 1886.

It will be remembered that in the report for 1885 the Committee on Disinfectants recommended as the most efficient non-destructive disinfectants the following :

Steam under pressure at 110° C. (230° F.) for ten minutes.

Dry heat at 110° C. (230° F.) for two hours (in the absence of spores<sup>1</sup>).

Boiling in water for one half to one hour.

These conclusions as then announced, which were largely based upon the committee's experimental work, have been generally accepted by sanitarians. The experimental researches of others, published since those of this committee, have corroborated the latter in all essential particulars.<sup>2</sup>

Apparatus for disinfection by heat may be divided into three classes :

1. Those in which dry hot air is employed ;
2. Those in which moist hot air is used ; and,
3. Those in which steam is the disinfecting agent.

As stated in the committee's report for last year,<sup>3</sup> dry hot air cannot be relied upon for disinfection when great penetrating power is required, as in disinfecting mattresses, feather beds, and thick bundles of clothing, or of cotton and woollen goods. Besides, dry hot air, of a sufficiently high temperature to act as an efficient disinfectant, often permanently injures textile fabrics and other objects requiring disinfection. The very recent investigations of Dr. Parsons and Prof. Max. Wolff fully attest the conclusions of the committee upon this point. Notwithstanding these objections, dry hot air may probably often be used as a disinfectant with good results if the above mentioned limitations be borne in mind. In no event, however, can dry heat be expected to prove an efficient disinfectant unless a temperature above 110° C. (230° F.) has been maintained for upward of two hours.

Dr. Parsons<sup>4</sup> formulates clearly the requisites of a good disinfection apparatus. They are as follows :

- “ 1. A uniform distribution of heat in all parts of the chamber ;
- “ 2. The maintenance of the heat with constancy at any required degree ;
- “ 3. A trustworthy index to the actual temperature of the interior at the time being ;

<sup>1</sup> *Vote* Report of the Committee on Disinfectants for 1885, p. 123.

<sup>2</sup> See Parsons : Supplement to the 14th Report of the Local Gov't Board. Max. Wolff : Virchow's Archiv. Bd., 102, p. 81 *et seq.* Grancher : Revue d'Hygiène, 1886.

<sup>3</sup> Page 110.

<sup>4</sup> L. c., p. 244.

"4. Rapidity of action, both in the first getting up of heat and in effecting disinfection; and,

"5. Economy of first cost and of working."

In none of the various apparatus designed for disinfection with dry hot air has a uniform distribution of the heat in the chamber been attained. In order to obviate this difficulty, some inventors and experimenters have rendered the hot air humid either by evaporating water in the disinfecting chamber, or by injecting steam into the same. By this means the distribution of heat is rendered more even, and its penetrating power is said to be increased.

In using hot-air apparatus, the fuel employed is of some importance. By the use of gas the heat can be maintained more equably than when coal, coke, or wood is used. The feeding of the furnace, when the latter forms of fuel are employed, allows a certain amount of cooling off, and hence a corresponding loss of heating time. When the heat is furnished by a current of steam circulating through a steam pipe properly disposed in the disinfecting chamber, the greatest degree of uniformity in the temperature can be maintained.

Apparatuses for disinfection by steam are of two sorts,—those in which the steam passes through the disinfecting chamber without compression, and those in which it is confined by pressure. In the former, the vapor is sometimes superheated by a secondary heating apparatus, and thus is probably equally efficient as the steam under pressure.

The committee desires to express its conviction, based upon the practical experience of some of its members, that the use of steam, and especially when superheated or under pressure, is the most efficient agent for the destruction of all sorts of infectious material.

The experiments of Prof. M. Wolff<sup>1</sup> show that with an apparatus of the former sort, an exposure of at least one hour was requisite for thorough disinfection.

The committee regrets that on account of want of means no practical study of the various apparatuses for heat disinfection could be undertaken during the past year. A trustworthy judgment upon the comparative merits of the different machines cannot therefore be expected or given. It is hoped, however, that the full collection of disinfecting machines illustrated in the appendices to this report will enable health officers and others interested to decide upon those most suitable for their use.

GEORGE M. STERNBERG,  
*Chairman.*

J. H. RAYMOND.

V. C. VAUGHAN.

CHARLES SMART.

S. H. DURGIN.

JOS. HOLT.

GEORGE H. ROHÉ.

<sup>1</sup> Virchow's Archiv. Bd., 102.

## APPENDIX "A."

## APPARATUS FOR THE APPLICATION OF DRY AND MOIST HEAT IN DISINFECTION.

By GEORGE H. ROHÉ, M. D., PROFESSOR OF HYGIENE IN THE COLLEGE OF PHYSICIANS AND SURGEONS, BALTIMORE; SECRETARY OF THE COMMITTEE.

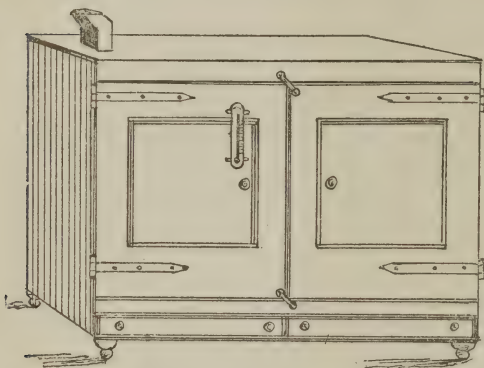


Fig. 1.—Large size.

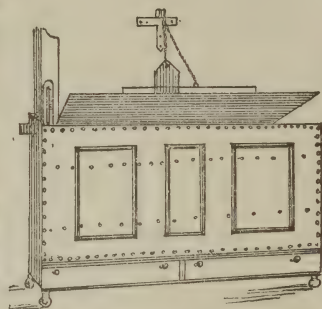


Fig. 2.—Small size.

## I. NELSON'S PATENT DISINFECTING APPARATUS.

[From Dr. Parsons's report on Disinfection by Heat, Fourteenth Annual Report of the Local Government Board, p. 253.]

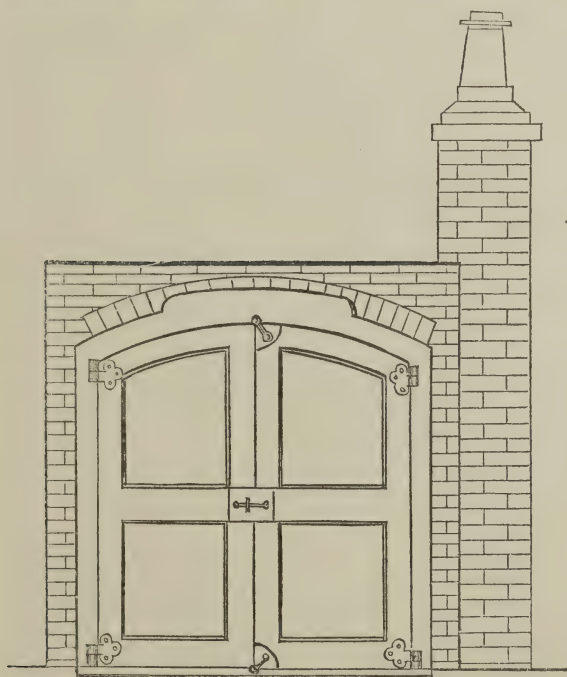
This apparatus consists of a rectangular iron chest with double side walls. The smaller sizes have a hinged and counterpoised lid; the larger ones, two doors opening in front. Underneath the bottom, which is of a single plate, is a series of luminous gas jets; the heated air from these plays upon the bottom, and, passing up between the outer and inner walls, is carried off by a flue without entering the interior of the chamber. The chamber is furnished with two openings for ventilation, an inlet at the bottom and an outlet at the top at the opposite end, communicating with the flue. These openings are furnished with slides by which they can be closed or opened. A thermometer is fixed near the outlet flue with the bulb in the space between the walls. This furnishes a guide to the temperature within the chamber. The manufacturers state that a temperature of  $60^{\circ}$  C. ( $140^{\circ}$  F.), as shown by the thermometer, corresponds to one of  $93.5^{\circ}$  C. ( $200^{\circ}$  F.) within the chamber. The external thermometer should never be allowed to exceed  $82.5^{\circ}$  C. ( $180^{\circ}$  F.). The apparatus was heated to a temperature sufficient for disinfection in ten minutes.



## 2. FRASER'S PATENT DISINFECTING APPARATUS.

[Dr. Parsons's Report, p. 255.]

This is made in two forms, stationary and portable. The first consists of a brick oven, the heat being supplied by coke. In the largest apparatus there are doors at either end, the bottom of the oven being level with the ground. The clothing to be disinfected is placed in latticed trays upon an iron truck, which is wheeled into the oven at one end. After exposure for a sufficient length of time to a proper temperature, the truck is withdrawn through the doors at the other end of the oven. (See accompanying plans.)



FRONT ELEVATION

Fig. 3.

In a smaller form of apparatus, suitable for hospitals, etc., there are doors at one end only, and the articles to be disinfected are placed on wooden trays in the chamber. Above the furnace is the door of a small fire-place, in which sulphur can be burnt to aid in the disinfection. The fumes enter the chamber through the iron grating which forms its floor. [This would seem to be unnecessary. If the temperature is sufficiently high, the sulphur dioxide is needless: if the heat is not high enough to disinfect the articles, the apparatus should be rejected. Dr. Parsons's experiments with the apparatus were not very satisfactory. It is, however,

used by many public sanitary authorities in England.] In the roof of the oven is an opening by which, when the damper is pulled out, a communication is established with the ash-pit of the furnace. This forms an outlet for ventilation, the sulphur stove acting as an inlet. The fumes given off from the materials subjected to disinfection are thus made to pass through the fire.

The portable apparatus is in the form of a van, being placed on four iron wheels. The chamber is seven feet long, four feet and six inches

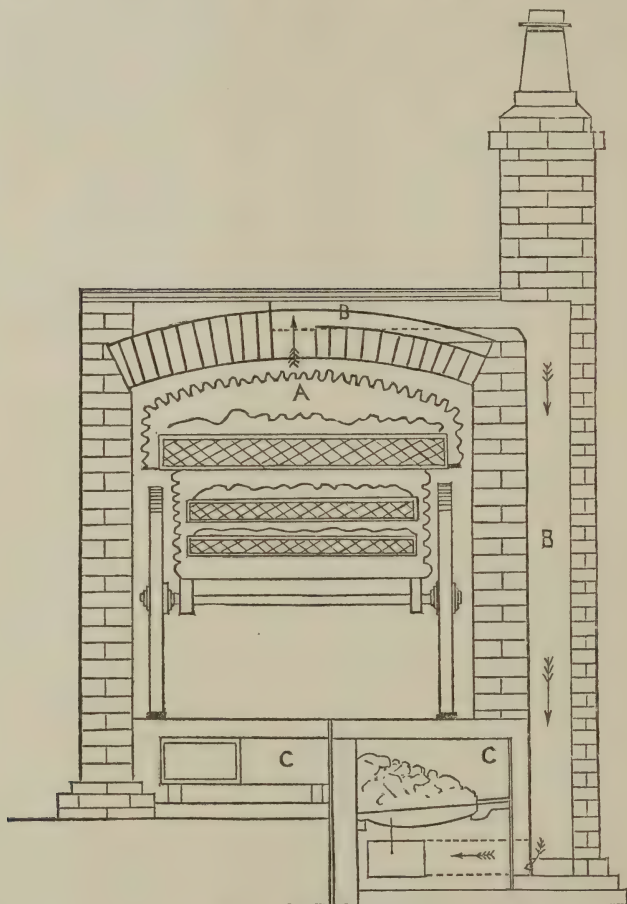


Fig. 4. Transverse section.

- A.*—Carriage in which infected articles are conveyed.
- B.*—Flue to draw vapors from inside of chamber through the fire.
- C.*—Furnace and smoke flues.

wide, and three feet high, internally. It is made of iron covered with felt, and cased externally with wood. Shafts can be attached, and the machine moved from place to place as required. The apparatus weighs about four tons.

In the larger apparatus coke is used as fuel, and the time required to raise the temperature to the proper height varies from an hour and a half to five hours and a half. In the portable machine the fuel used is coal.

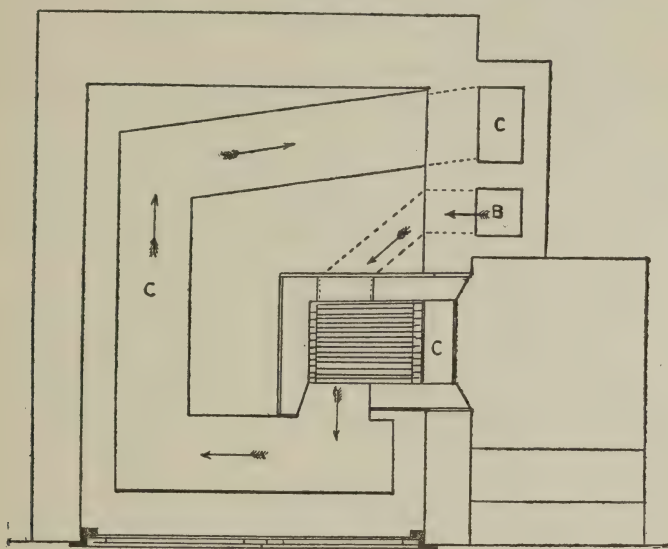


Fig. 5.

*B.*—Flue to draw vapor from inside of chamber through the fire.

*C.*—Furnace and smoke-flues.

In an experiment lasting an hour and a half, and with the expenditure of twenty-four pounds of coal, the temperature was raised to  $149^{\circ}$  C. ( $300^{\circ}$  F.). In six hours fifty-six pounds of coal were consumed.

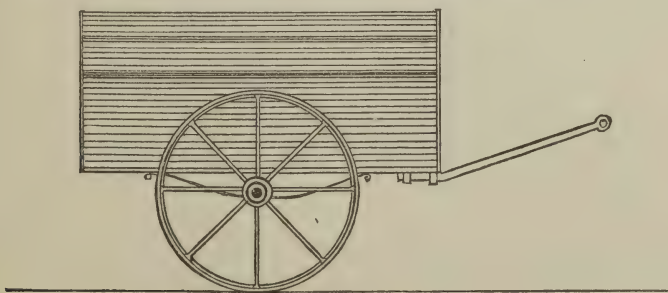


Fig. 6.

Carriage in which infected articles are conveyed.



## BRADFORD'S PATENT "SAFETY" DISINFECTING APPARATUS.

[Dr. Parsons's report, p. 269.]

This consists of two parts, the base and the container. (See Fig. 7.

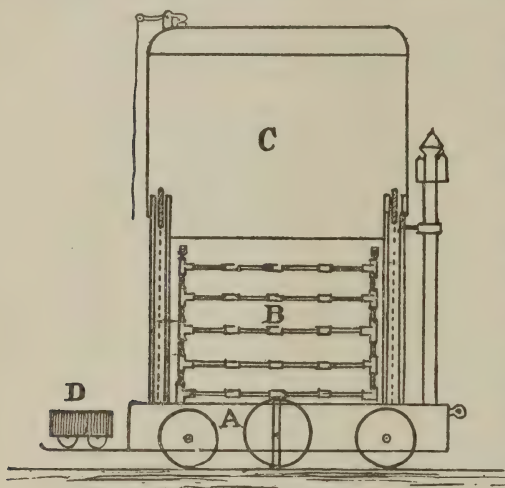


Fig. 7.

- A.—Base.  
 B.—Rack on which infected articles are placed.  
 C.—Container.  
 D.—Movable fire-basket.

The base is divided longitudinally into three compartments, of which the central one is the heating chamber, and the side ones are for ventilation, communicating with the fire-chamber by slide-valves. The fire-chamber has a door at one end and a flue at the other. The fire is contained in a wagon running on wheels, which can be drawn out for convenience of stoking. Peat, coal, coke, or charcoal may be used as fuel. The roof of the fire-chamber is formed of hollow iron bars, triangular in section, and open at the ends,

for the purpose of affording a large heating surface. The remainder of the base is covered with a layer of sand upon which the container rests. The container is a large rectangular iron box, covered with non-conducting composition, open below, and suspended by chains and counterpoises from pillars at each corner of the base, after the manner of a gas-holder. There is a valve in the roof for ventilation.

The articles to be disinfected are placed on a galvanized iron rack which stands on the base over the fire-chamber, and when in position the container is let down over them and rests on the base, forming with the sand a sufficiently close joint. The base is made to run on wheels, so that the apparatus may be moved from place to place.

The rack is made of tubes to serve for the admission of steam into the container, and evaporating dishes containing water are placed at the bottom over the fire chamber. A fixed form of the apparatus on a large scale is shown in the accompanying plans, (Figs. 8-12).

## BRADFORD'S "SAFETY" DISINFECTING APPARATUS.

ANOTHER FORM OF THIS APPARATUS.

[Parsons, p. 272.]

In this form the base is fixed. The furnace is of brick, with a fire-brick bridge, and occupies the greater part of the base, the cellular bars projecting beyond it so as to cover nearly the whole area. Above these



Fig. 8.

are two large, flat, iron evaporating vessels, with inflexed edges to prevent boiling over. The water in these is maintained at a constant level by a pipe communicating with a feeding cistern outside. Above the evaporating dishes is an iron plate covered with asbestos to cut off direct radiation from the heated base.

The container, which measures 8 ft. long, 8 ft. wide, and 4 ft. 6 in. high, is raised by a crab with worm-wheel instead of being counterpoised.

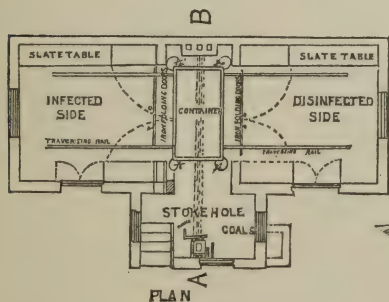


Fig. 9.

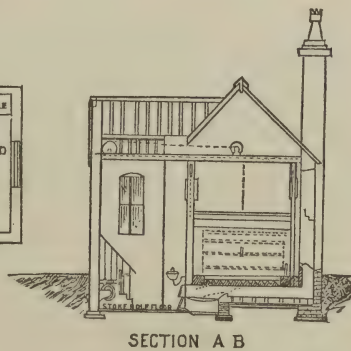


Fig. 10.

It fits, as in the other, on a sand-joint. The iron horse, on which clothes, etc., are placed, slides out at the side on wheels running in iron grooves.

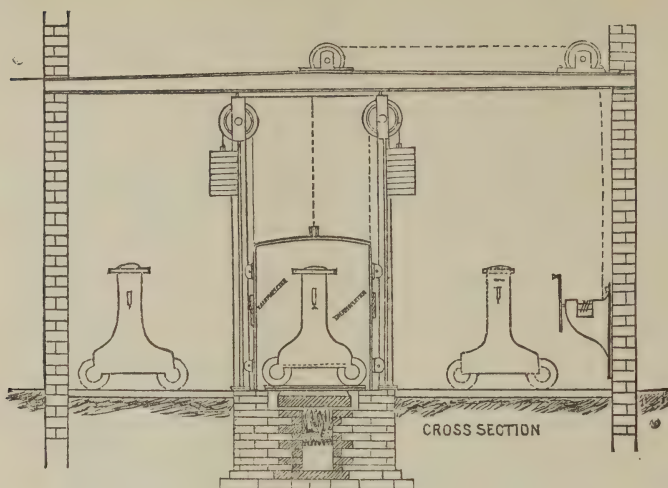


Fig. 11.

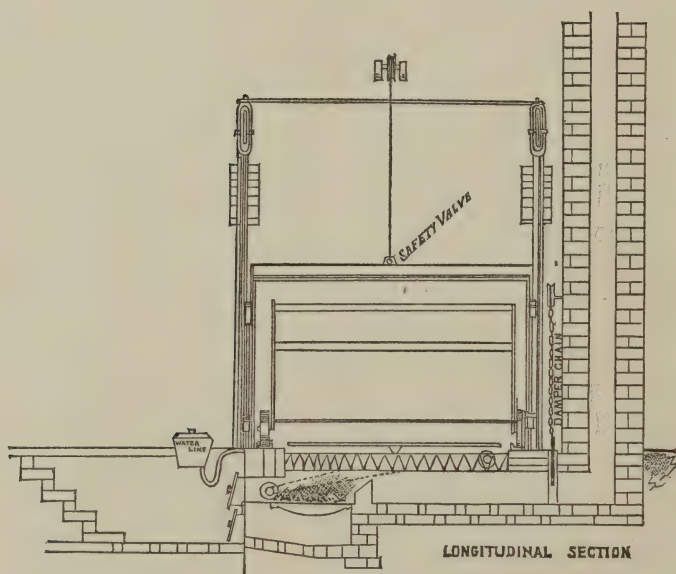


Fig. 12.

## MERKE'S DISINFECTING APPARATUS.

This apparatus was first constructed in 1873 for the use of the Municipal hospital at Moabit in the suburbs of Berlin. The first form of the machine was defective in some of the technical details; and in 1879 a new apparatus was constructed according to the plans of the superintendent of the hospital, Mr. H. Merke. The following description is given by the inventor: <sup>1</sup>

<sup>1</sup> Virchow's Archiv. Bd., '77, 4tes Heft., Sept., 1879.



The apparatus consists of an outer wall of 5 inches thick, an inner wall of 10 inches, and a space of  $2\frac{3}{4}$  inches between the two. This space is filled with sawdust, and is intended to prevent the rapid conduction of heat from the interior of the chamber. The floor is of cement, and is likewise isolated by a layer of sawdust from the masonry base. In one of the walls is an iron door 5 feet high and 26 inches wide, which can be tightly closed against a felt rim by means of a screw. In the inner wall is an iron sliding door. In the slightly arched roof is an opening 8 inches square leading into the chimney, which extends 8 feet above the roof of the chamber. Two feet above the roof the chimney is furnished with an iron damper, which can be raised by means of a chain working over a pulley. The isolating layer

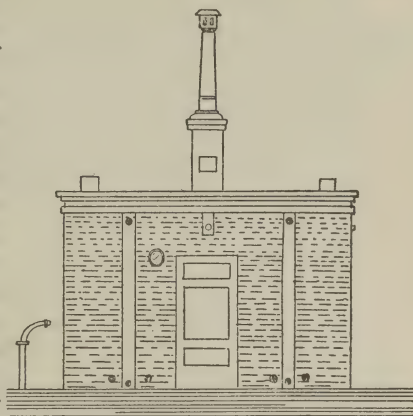


Fig. 13.—Front elevation.

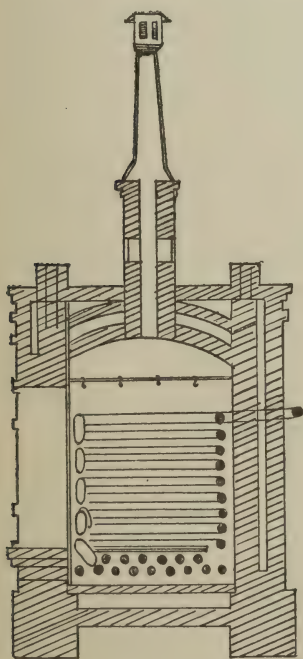


Fig. 14.—Longitudinal section.

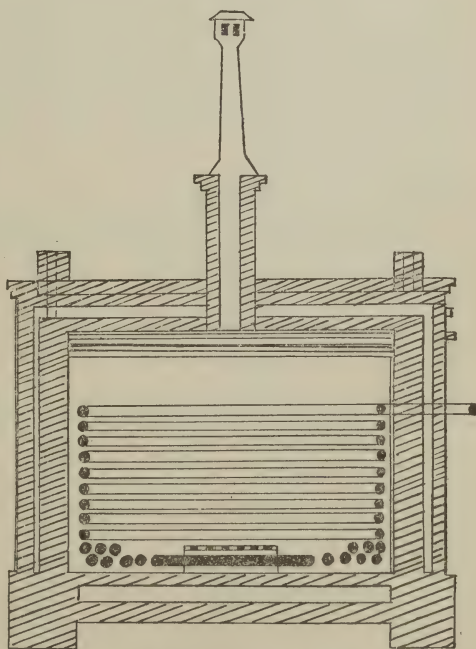


Fig. 15.—Transverse section.

of sawdust is ventilated by ventilators extending above the roof. The interior of the chamber is 7 feet 4 inches high, 9 feet 10 inches long, and

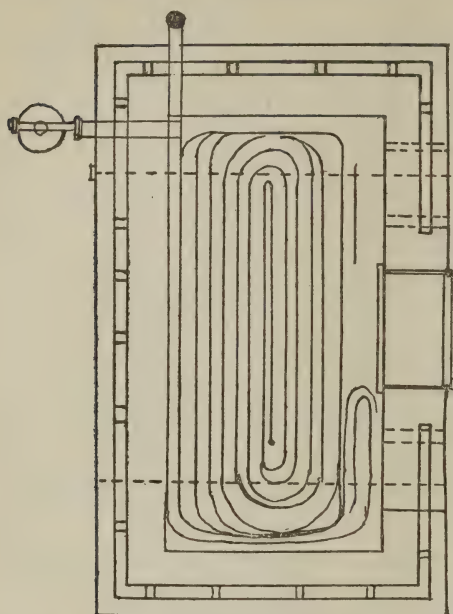


Fig. 16.—Plan showing arrangement of heating pipes.

5 feet wide. At an elevation of 5 feet 8 inches above the floor a strong copper steam pipe, 3 inches in diameter, enters the chamber, and is continued in spirals around the interior of the inner wall, and in a double layer upon the floor. The pipe terminates externally in a condenser. Two tubes,  $2\frac{1}{4}$  inches in diameter, admit air into the chamber about 2 inches above the floor. Near the upper right-hand corner is a pyrometer, which indicates the temperature in the interior.

In order to use the apparatus, the articles to be disinfected are hung up on hooks in the chamber. The doors are closed, and the steam turned into the copper steam pipe. The damper in the chimney and the valves of the air tubes are opened for half an hour to allow all moisture to be driven off. They are then closed. The steam is passed through the pipe until the temperature of the chamber, as indicated by the pyrometer, is raised to  $125^{\circ}$  C. ( $257^{\circ}$  F.). This is usually reached in half an hour, and is then maintained about an hour longer. During the last half hour the air tubes and chimney damper are again opened to permit ventilation. In fifteen minutes after opening the doors the temperature has fallen to  $35^{\circ}$ – $40^{\circ}$  C. ( $95^{\circ}$ – $104^{\circ}$  F.), allowing the removal of the disinfected articles.

The entire cost of erection of this apparatus was 2,035 marks (about \$500). This does not include the steam boiler.

The distribution of heat in the interior is fairly equable. The experiments of Wolffhügel<sup>1</sup> showed a difference of  $11.8^{\circ}$  C. ( $21^{\circ}$  F.).

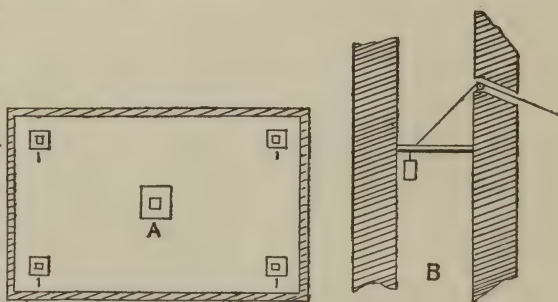


Fig. 17.

A.—Plan of roof of chamber. *IIII*.—Ventilators of isolating spaces. B.—Section of chimney showing damper.

<sup>1</sup> Mittheilungen a. d. Kais. Gesdhtsamte, Bd. I.

## DR. HERON ROGERS'S PORTABLE DISINFECTING CHEST.

[Dr. Parsons's report, p. 264.]

This is a rectangular chest [Fig. 18] 3 ft. 6 in. long, 2 ft. 6 in. wide, and 2 ft. 9 in. high, mounted on four iron wheels, and with a handle at one end. The sides, ends, and bottom are double; and in the bottom there is at one end an opening in the outer casing, under which a fire-box is slid. The products of combustion ascend in the interspace between the casings, and find an exit by a flue at the end opposite the fire-box. The lid is a sliding plate of iron. A box (*a*) with a sliding lid is provided for the conveyance of infected articles. This box is intended to be inverted over the mouth of the chest, when, the lid being withdrawn, the articles within are

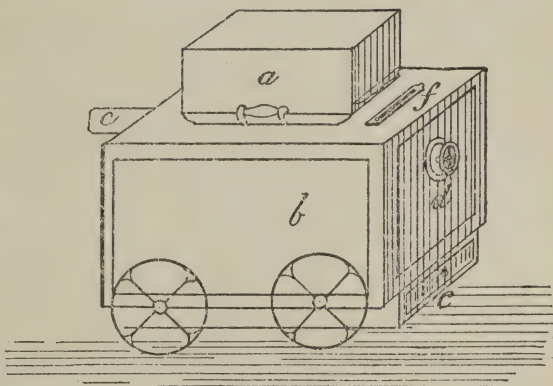


Fig. 18.

- A*.—A loose wooden box, by which clothing, &c., is brought from the sick-room without danger of infection.
- B*.—Hot-air disinfecting chest.
- C*.—Fire or other heating agent.
- D*.—Fresh-air valve, by which noxious vapors, &c., are forced into chimney, *E*, which is connected with an ordinary flue or pipe.
- F*.—Thermometer.

allowed to fall upon brackets in the interior of the chest. In the top of the chest, at the end above the fire-box, a thermometer is fixed, the bulb encased in an iron tube extending downward six inches into the interior of the chest. The thermometer does not indicate accurately the temperature in the chamber. Coal is used as fuel. It takes about an hour after the fire is lighted to reach the temperature required.

## DR. RANSOM'S SELF-REGULATING DISINFECTING APPARATUS.

[Dr. Parsons's report, p. 277.]

This consists of a cubical iron chamber, cased in wood, with an intervening layer of felt, access to the interior being obtained by double doors. As manufactured for municipal disinfecting stations, the chamber has doors on opposite sides, and is placed in the partition wall which divides the establishment into two sides,—an “infected” and a “clean” side,—infected articles being carried into the apparatus on one side, and removed, when disinfected, on the other.

The furnace is placed at the side of the chamber, and at a lower level. It consists of a ring of atmospheric gas-burners enclosed in an iron tube.



The heated air containing the products of combustion passes along a horizontal flue, and enters the chamber at the bottom, which is perforated by a number of holes for its equable distribution. In the horizontal flue are fixed the bulbs of a thermometer (*H*, Fig. 19) and of a self-acting mercurial regulator. Through the latter the gas-supply to the burners can be made to pass; and it is so constructed that as the temperature of the apparatus rises, the mercury expanding encroaches upon a slit (*A*, Fig. 19), through which the gas passes, and thus gradually cuts off the supply.

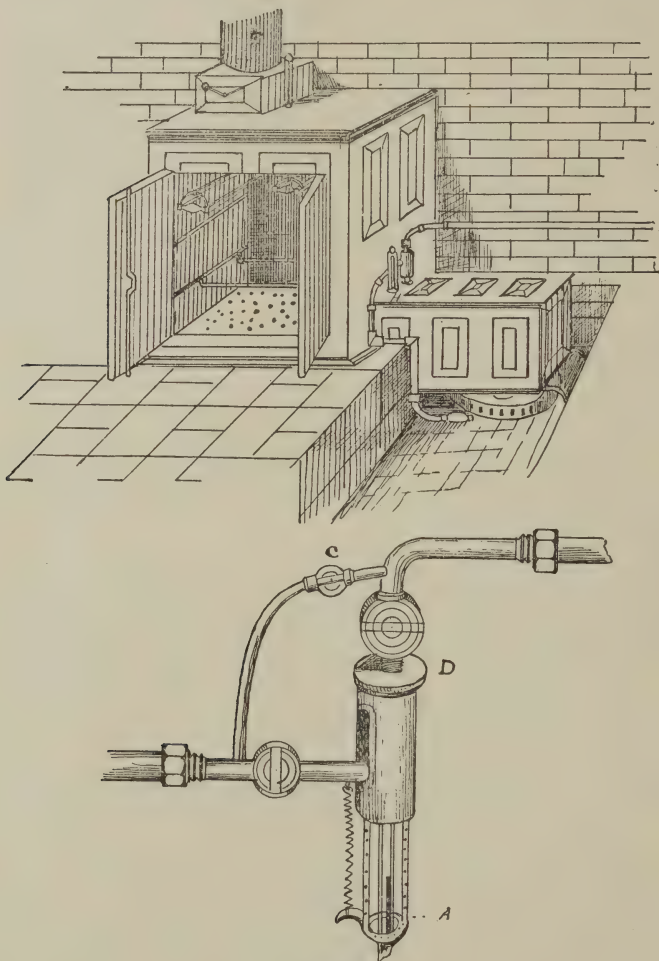


Fig. 19.

At the top of the chamber there is an outlet flue controlled by a valve, and furnished with a thermometer (*E*, Fig. 19). In connection with the outlet is an arrangement designed for the extinction of fire. When the temperature at the outlet exceeds  $149^{\circ}$  C. ( $300^{\circ}$  F.), a link of fusible

metal melts, closing a damper, and shutting off the supply of gas. The chamber is fitted with bars and hooks for suspending clothing and other articles to be disinfected.

When the stove is first lighted, the gas is admitted to the burners direct through a short circuit pipe (*C*, Fig. 19) without passing through the regulator; but when the mercury in the latter has risen high enough to reach the slit, this pipe is closed by a tap so as to compel the gas to pass through the regulator. The regulator is furnished with an adjusting screw (*D*, Fig. 19), so that it can be set to work at a higher or lower temperature as required. It takes from three to four hours to raise the temperature to  $121^{\circ}$  C. ( $250^{\circ}$  F.).

The great merits of this apparatus are the even distribution of heat and the accuracy with which the temperature can be adjusted and kept constant without supervision. Hence it may be used for the disinfection of such articles as will bear a temperature of  $121^{\circ}$  C. ( $250^{\circ}$  F.) with little risk of injury. The chief drawback to its use appears to be the long time which it takes, first, to raise the chamber to the required temperature, and, second, to accomplish the penetration of heat into bulky non-conducting articles (pillows, mattresses, etc.). Another inconvenience is that the gas flame is liable to "catch back," especially if the doors to the chamber be suddenly opened or shut,—*i. e.*, the gas burns before instead of after its admixture with air, with the result that little heat enters the chamber, but that the gas pipes get strongly heated. The occurrence of this accident is indicated by a slight explosion; and if it be found to have taken place, the gas must be extinguished and relighted.

## LEONI'S PATENT DISINFECTOR.

[Dr. Parsons's report, p. 280.]

This apparatus consists of a cylinder built of tiles set in an iron frame, and in shape and size somewhat resembling a diving-bell. The internal

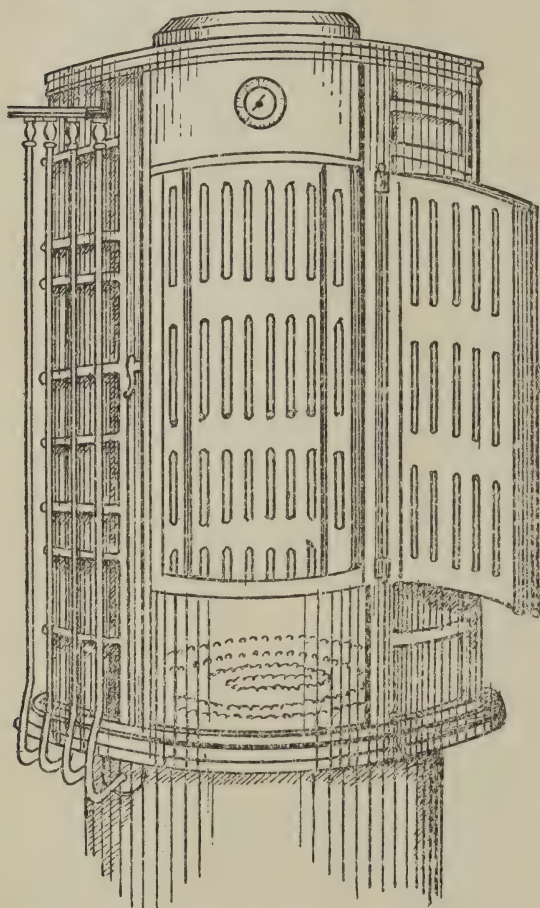


Fig. 20.

diameter is 4 ft. 8 in., and the height 9 ft., of which about 6 ft. are above the level of the floor. In front there is a door by which access to the interior is obtained. The door is not of the full height of the chamber. Three feet below the floor level are rings of atmospheric gas-burners, so arranged that one or more rings can be used at a time. At the floor level is a grating upon which articles to be disinfected can be placed; and in the walls and roof of the chamber are arrangements of bars and hooks upon which other articles can be suspended. The articles to be disinfected are thus 3 feet above the gas flames. In the centre of the roof is an outlet, which can be closed by a sliding valve. To prevent loss by radiation, the disin-

fectors are encased in brickwork except in front. The disinfected articles have to be taken out by the same way that infected articles are put in, thus apparently involving some risk of their being reinfected. The consumption of 70 cubic feet of gas and half an hour of time suffices to raise the temperature in the chamber to 149° C. (300° F.).



## SCOTT'S PATENT DISINFECTING APPARATUS.

[Dr. Parsons's report, p. 282.]

Two forms of this apparatus are made: in one the heat is furnished by gas, and in the other by coal. The former is the more desirable. The apparatus consists of a brick or iron oven enclosed in a brick building. A partition wall, level with one end of the oven, divides this building into two distinct compartments, the larger for infected and the smaller

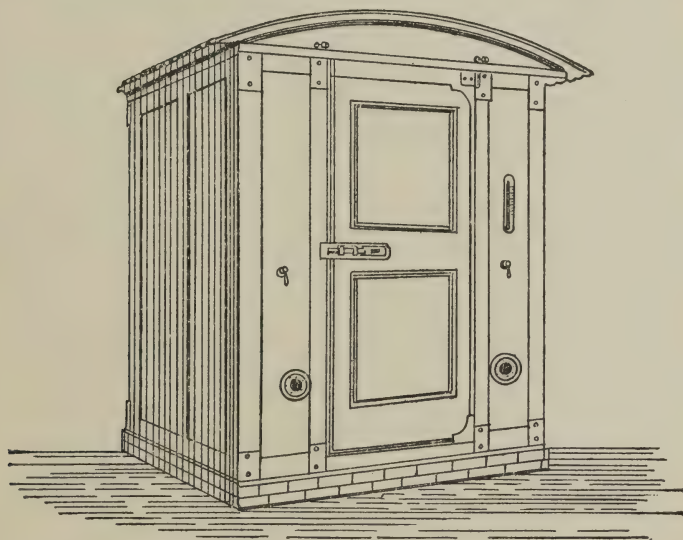


Fig. 21.

for disinfected articles. The supply of gas can be governed by an automatic gas regulator. The gas is burned by means of a double crown of burners covered by a plate of sheet iron, upon which a vessel of water may be placed to supply moisture to the air by evaporation. In a test the temperature was raised to above  $150^{\circ}$  C. ( $305^{\circ}$  F.) in an hour, with the consumption of 200 cubic feet of gas.

## JENNINGS'S DISINFECTING APPARATUS.

[Dr. Parsons's report, p. 287.]

This is a doubled-walled iron chamber, with a heavy iron lid. The iron plate of which the apparatus is made is  $\frac{1}{8}$ " thick. The space between the plates forming the walls is 3 inches at the bottom, diminishing to  $\frac{3}{8}$ " at the top. The bottom of the chamber is formed of a single iron plate. The sides and lid are coated externally with asbestos composition, with a view of economizing heat. Beneath the bottom, and at a distance of

$1\frac{1}{2}$ " from it, is a series of atmospheric gas-burners containing 500 jets. The space between the inner and outer shells is open at the bottom, and

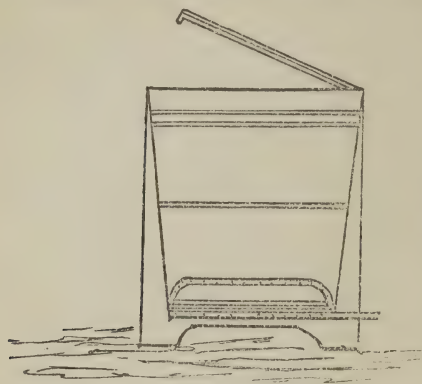


Fig. 22.

communicates above with the interior of the chamber by a double row of holes around the four sides. The interior of the chamber is connected by a flue at the side by an aperture opening in the centre of the bottom, and capable of being opened and shut from the outside by a sliding valve.

The heated air ascending from the burners impinges upon the bottom of the chamber, and ascending in the space between the two cells, enters the interior

through the holes, and is drawn off by the flue.

Eighty cubic feet of gas raised the temperature to a sufficient height in half an hour.

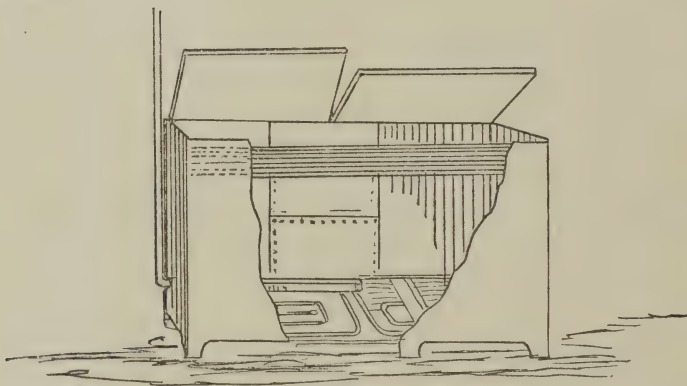


Fig. 23.

### TAYLOR'S DISINFECTING CLOSET.

[Dr. Parsons's report, p. 274.]

This is built of brick, its dimensions being 7x7x7 feet. The cut (Fig. 24) shows the external appearance without further description. The interior is divided into two compartments by a perforated brick wall, which does not, however, reach to the roof or to the back wall. In the right compartment is the body of the furnace, which is horizontal, and made of corrugated cast iron, with a chimney at the far end. There is a sliding door at the side of the chamber, through which, if desired, sulphur can be placed on the roof of the furnace. The left compartment contains two iron horses, which slide in and out on rails in the

floor. At the back of the chamber is a pipe communicating with a boiler. Through this pipe steam can be blown into the chamber. The

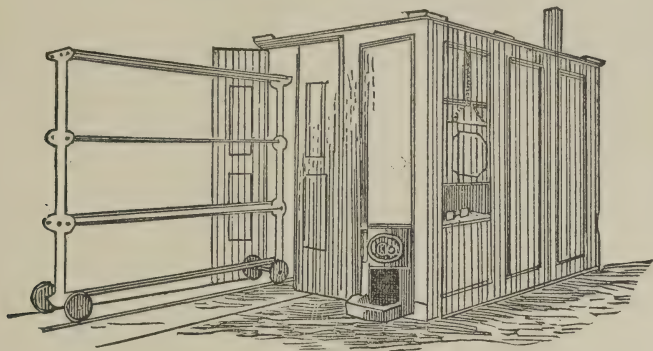


Fig. 24.

air from the chamber can be made to pass through the furnace. From 60 to 75 pounds of coke are consumed each time of using the apparatus.

#### RAETKE'S DISINFECTING OVEN.

This consists of a rectangular sheet-iron box 5 ft. long, 5 ft. high, and 3 ft. 3 in. broad. The chamber is divided by an iron partition, which divides the chamber into two compartments, the larger one for the reception of the articles to be disinfected, and the smaller, which contains a grate, and above it a reservoir for the heated air. A valve, which can be opened or closed from without, divides the hot-air reservoir from the disinfecting chamber. The fuel used is coke, or coke and coal. The temperature of the interior is indicated by a thermometer in the cover of the apparatus. The apparatus is portable. Experiments by Prof Max. Wolff<sup>1</sup> show that this machine is capable of producing all the disinfectant effects to be obtained from dry heat.

#### GENESTE, HERSCHER ET CIE'S DISINFECTING APPARATUS.

A model of this machine is in the Museum of Hygiene at Washington, D. C. It consists of a chamber heated by a coil of steam pipes at the bottom and around the sides. Some of the steam pipes are perforated to permit the escape of steam into the chamber during the disinfection. The apparatus is portable, but can only be used where steam can be obtained. There is a door at each end of the apparatus, and the articles to be disinfected are placed upon a framework running upon a track. A thermometer in the side of the apparatus is intended to indicate the internal temperature. The steam used is not under pressure.

<sup>1</sup> Virchow's Archiv. Bd., 102, p. 83.



## LYON'S PATENT STEAM DISINFECTOR.

[Dr. Parsons's report, p. 293.]

This consists of a large and strong iron chamber, with double walls of boiler plate, and provided with a tightly fitting door at one or both ends.

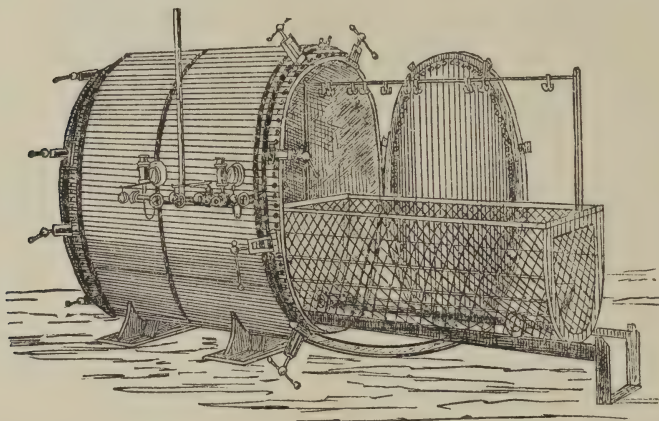


Fig. 25.

The chamber is usually made elliptical in section, the long diameter of the ellipse being vertical for the more convenient reception of bulky articles, as mattresses, sofas, etc. In its original form it had a door hung

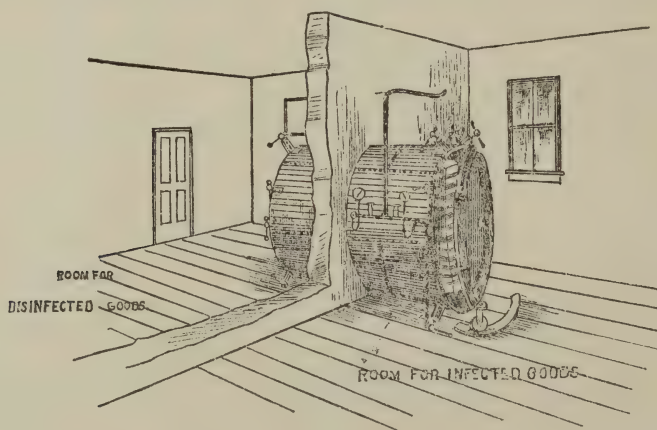


Fig. 26.

on hinges at one end only, the back being steam jacketed like the circumference. This form was made to run on wheels for removal from place to place, if desired.

Another form, designed for a town disinfecting station, and intended to be placed in the partition wall dividing the building into two sides for infected and disinfected articles respectively, is cylindrical, and has a door at either end. The doors swing on hinges, their weight being borne by a castor running on a curved rail. The door shuts against an India-rubber collar, and is fastened with screws to make a steam-tight joint.

Steam from a boiler can be admitted into either the hollow casing or the interior of the chamber. A steam gauge registers the pressure. If a higher temperature is desired in the chamber, it may be secured by increasing the pressure of the steam in the casing. The latter procedure has an additional advantage, as it prevents the condensation of the steam in the chamber, thus keeping it in the condition of "dry steam."

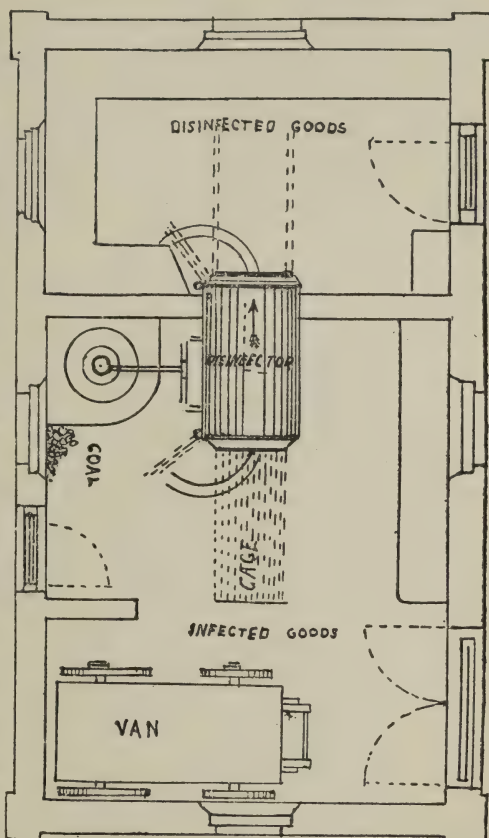


Fig. 27.

### BENHAM & SONS' STEAM DISINFECTOR.

[Dr. Parsons's report, p. 297.]

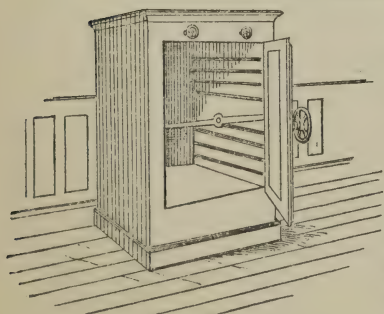


Fig. 28.

This consists of a rectangular iron chest resembling a fire-proof safe, the internal dimensions being 3 ft. long, 1 ft. 6 in. wide, and 3 ft. 6 in. high. It is surrounded by a steam jacket one inch thick, except on the side formed by the door, and for a space three inches in width surrounding it. The chest itself is of cast iron, the outer wall of the jacket being  $\frac{3}{16}$  in. boiler plate. Steam from a boiler can be

admitted both into the casing and into the interior of the chamber. The door is formed of a plate of cast iron strengthened by ribs and opening on hinges. The face against which it shuts is furnished with an India-rubber collar set into a groove. The door is secured by a single large screw in the centre, working into a female screw in a strong iron bar which lies across the mouth of the chamber, resting in a groove on either side, so that it can be removed to allow articles to be placed in the chamber. This form of fastening allows the door to be opened with great facility and expedition, but is not adapted to sustain a high pressure.

#### BRADFORD'S STEAM DISINFECTOR.

[Dr. Parsons's report, p. 300.]

This apparatus is a horizontal cylinder of boiler plate 7 ft. long and 4 ft. in diameter, supplied with steam from a boiler. It is covered with a non-conducting composition. It has not a complete steam jacket, but there is a square steam chamber applied to the bottom, into which steam can be let by a branch pipe in order to warm the cylinder. This chamber is furnished with a "steam trap" to run off condensed water. The cylinder has a door at either end. The doors are hung from wheels running on bars overhead. The two ends of the cylinder are isolated from each other by a partition wall dividing the apartment in which the machine is contained into two rooms, as in Lyon's apparatus.

#### GIBIER'S MOVABLE DISINFECTING STOVE.

[*Journal d'Hygiène*, July 22, 1886.]

M. Paul Gibier recently presented at the Academy of Medicine of Paris a design for a steam disinfecting stove, which has many novel features. The apparatus may be taken to pieces and easily transported. The inventor claims as one of its advantages that it can be taken into the sick-room, and disinfection of infected articles accomplished on the spot.

The base consists of a stove, the top of which is formed of a shallow basin constituting the boiler. From an outlet in the bottom of the boiler a pipe runs to one side of the stove-case, where it terminates in a stop-cock. By this means the boiler is emptied of water when the disinfection is completed. Over the boiler is a perforated plate, upon which the objects to be disinfected are placed. This forms the bottom of the disinfecting chamber, which is made of segments of sheet iron covered with felt to retard escape of heat. The different segments are easily and rapidly joined by means of the clamp-screws, as shown in the figure.

After the articles to be disinfected are placed in the chamber, the top, which is furnished with a thermometer projecting into the interior of the chamber, is put into its place and fastened by means of clamps. A steam pipe furnished with a stop-cock leads from the top of the chamber into



the stove pipe, which connects with the chimney. The fuel used is wood, coal, or coke.

In order to use the apparatus, the boiler is filled with water, and the fire lighted. The infected articles are placed in the chamber, the top clamped on, and the cock (*RE*) on the steam pipe turned off in order to raise the pressure in the chamber. This need not, indeed, cannot, be raised much above the ordinary pressure of the atmosphere. The steam given off from the open surface of the boiler penetrates the objects to be disinfected, and rapidly destroys all pathogenic organisms. By means

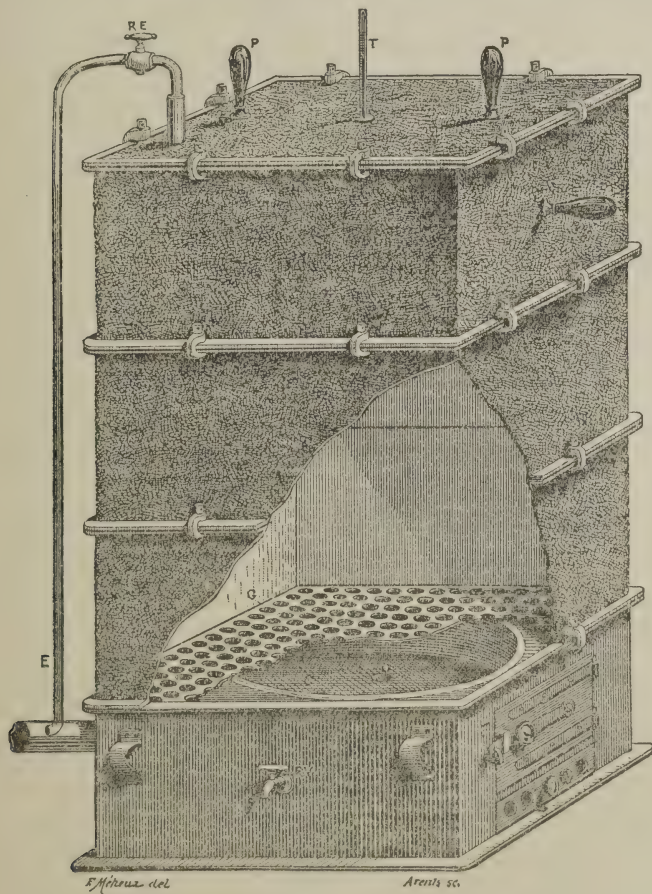


Fig. 29.

of this apparatus M. Gibier claims to have sterilized cultures of the microbes of cholera, typhoid fever, pneumonia, septicæmia, yeast, charbon, and aspergillus in the centre of a feather bed after exposure for two hours. This would be quite a satisfactory test, if the size (thickness) of the feather bed had been given.

M. Gibier does not aim at a higher temperature of the steam than  $100^{\circ}$  C. ( $212^{\circ}$  F.).

#### RECK'S PATENT STEAM DISINFECTOR.

This is recommended by the royal Danish health authorities, and is constructed in two forms. The cylindrical form consists of an iron chamber 7 ft. long and 3 ft. in diameter, with a steam-tight door at each end. It is placed horizontally; and the building in which it is placed is divided by a partition into two apartments,—one for infected and the other for disinfected goods. The steam is generated in an iron boiler, and enters the chamber at the top (*f*), making its exit at the bottom (*g*). A layer of small stones (*P*) (fragments of granite) is put in the bottom

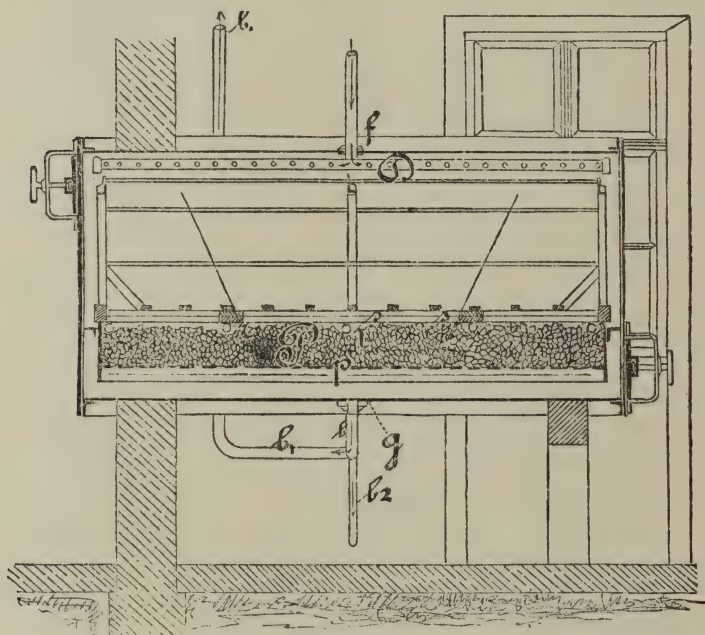


Fig. 30.

of the chamber, which, by becoming heated by the passage of the steam, assists in drying the air, which is admitted after turning off the steam, and drying the disinfected articles. The steam is not under pressure; hence the temperature in the chamber does not exceed  $100^{\circ}$  C. ( $212^{\circ}$  F.). A thick layer of felt surrounds the chamber to prevent the rapid escape of heat. No record of experimental tests of disinfecting power could be found.



## GENESTE, HERSCHER ET CIE'S STEAM DISINFECTOR.

[*Scientific American*, August 28, 1886.]

Messrs. Geneste & Herscher's stove consists of a large, horizontal metallic cylinder, forming a purifying chamber in which the objects treated

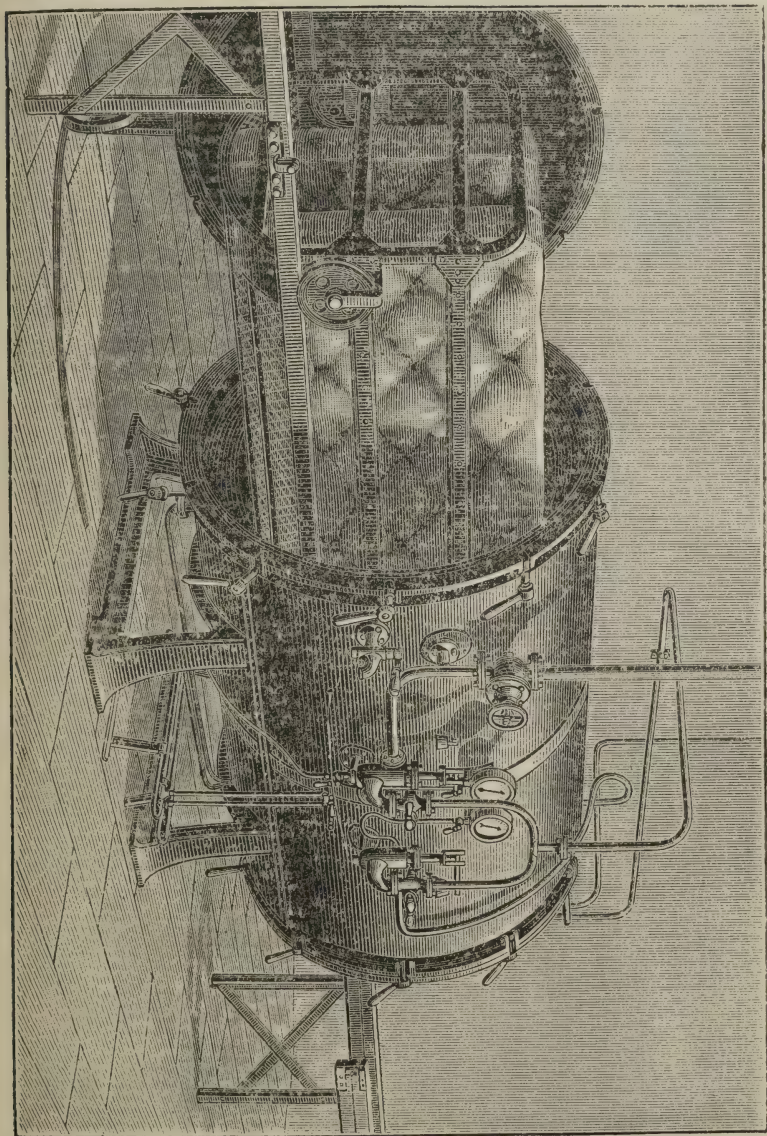


Fig. 31.

are directly exposed to the action of steam under pressure. Although the said pressure should normally correspond to  $+110^{\circ}$  C. (only about



half an atmosphere), and be regulated by a safety valve to a maximum of  $115^{\circ}$  ( $1\frac{1}{2}$  lbs.), the body of the cylinder is constructed of iron plate of a resistance much above such a limit. The cylinder is surrounded by an isolating jacket, and provided with entrance and exit doors that are mounted upon pivots and move upon a roller. These are closed by means of bolts, the joint being formed of a circular groove containing an elastic and hermetical packing. The interior of the stove is provided at the right and left with a track upon which runs a carriage designed to receive the objects to be disinfected. In front of and behind the cylindrical body a double track permits the carriage to put itself in position to be loaded or unloaded, these two operations having to be performed in two separate parts of the disinfecting establishment in order to prevent disinfected objects from getting mixed with infected ones.

In the interior of the stove there are two sets of heaters, each consisting of a row of iron tubes of small diameter. One of these is at the top, is covered with a screen, and is designed to prevent spotting and wetting through the dropping of water of condensation from the inner surface of the stove. The other, which fills the space below the carriage, is so arranged as to effect a rapid drying of the objects after disinfection.

The objects to be disinfected, having been placed upon the carriage, are introduced into the stove. After the disinfection is completed, it will be necessary to partially open one of the doors in order to free the articles from the small amount of dampness that they possess.

#### DOBROSLAVINE'S "SELHYDRIC" DISINFECTING STOVE.

[*Revue d'Hygiène*, June, 1886.]

This apparatus of novel construction consists of a double-walled cylindrical copper kettle imposed upon an iron stove. The latter is lined

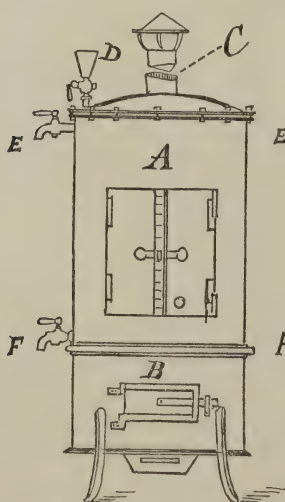


Fig. 32.—Elevation.

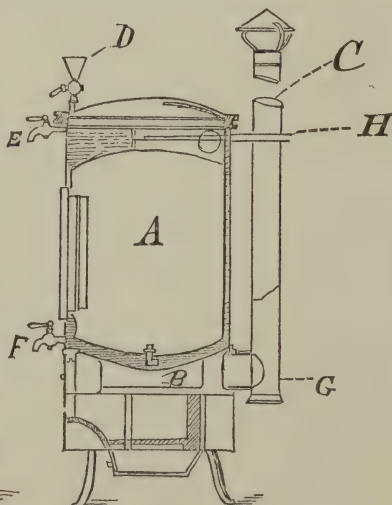


Fig. 33.—Longitudinal section.

with fire-brick. The space between the walls of the kettle, and between the roof of the stove and the bottom of the copper kettle, is occupied by a saline solution (usually solution of chloride of sodium, 40%). At one point (*H*, Fig. 33) is a little cistern communicating with the space between the perpendicular walls. The communication between this cistern and the annular space is made by means of a valve. Having filled the space with the saline solution until the latter overflows into the cistern, a valve with a float attached is automatically closed, cutting off

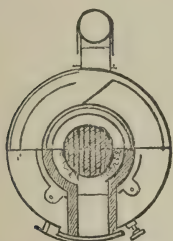


Fig. 34.—Plan at *G*, Fig. 33.

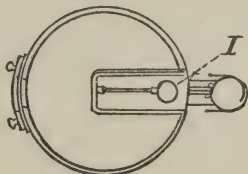


Fig. 35.—Plan at *H*, Fig. 33.

*A*.—Copper cylinder; *B*.—Stove; *C*.—Flue; *D*.—Funnel for filling cistern; *E*.—Cock for emptying cistern; *F*.—Cock for emptying saline solution; *I*.—Ball-valve in fresh-water cistern.

the communication between the cistern and the interparietal cavity. The cistern is then filled with pure water; and when the level of the saline solution is depressed by its transformation into steam, the float opens the valve and allows the pure water to flow into the annular boiler, thus maintaining the saline solution at a uniform density.

A lead pipe runs from the under surface of the top of the kettle between the two walls of the kettle, and opens into the disinfecting chamber in the centre of the bottom. The steam disengaged from the surface of the solution passes down through this tube, and is superheated on its passage through the saline solution. It enters the disinfecting chamber at a temperature equivalent to the boiling point of the solution.

#### PARKER & BLACKMAN'S STEAM DISINFECTING APPARATUS FOR BALED RAGS, ETC.

This apparatus consists of an ordinary engine of sufficient power and boiler strength, with an attached superheater. To this is appended a series of iron boxes about the shape of and large enough to admit a bale of rags pushed in endwise. Each one of several boxes has penetrating through from the rear end five gimlet-bit screws nearly as long as a bale of rags, enlarged from a point to about two inches in diameter, and at such a distance apart as to about equally divide the end of a bale. These screws are hollow, and are perforated in their whole circumference and length; and, moreover, each one is the terminus of a steam-escape cock.

The screws are rapidly revolved by the machinery. On pushing in a bale of rags, it no sooner comes in contact with the points of the screws than it is drawn with great rapidity. The box is now closed by a flap door, hinged at the top, and the steam turned on in through the screws and around the bale. In two or three minutes the temperature of the bale throughout, as thus exposed, can be raised to 330° F. (or more, if required), and sustained for any desired length of

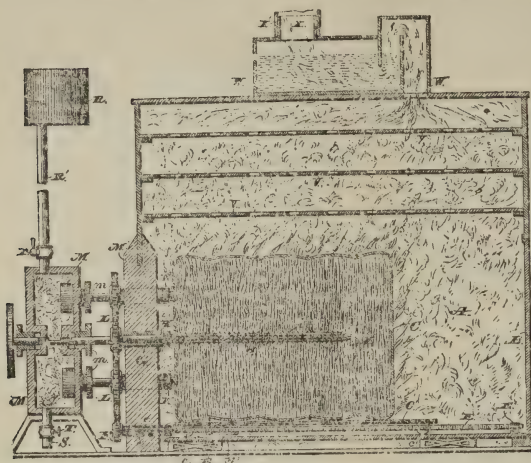


Fig. 36.

time. But they become so thoroughly penetrated with heat in ten min-

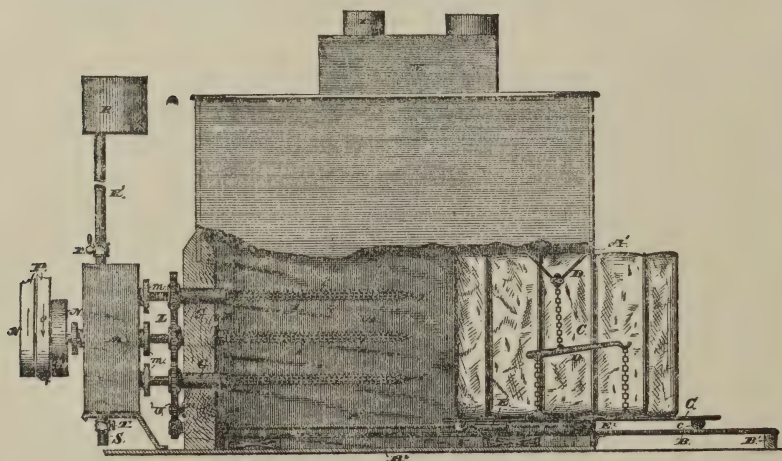


Fig. 37.

utes that a high temperature is kept up for several hours after they are removed. This is tested by pushing a thermometer into the screw holes. This apparatus is patented.

#### SCHIMMEL'S DISINFECTING APPARATUS (MERKE'S DESIGN).

This consists of a sheet-iron chamber with double walls, the space between the latter being filled with sawdust in order to retain the heat. In the interior of the chamber are two sets of steam pipes,—one for heating the air, and another, which is perforated, for the purpose of liberating steam. The objects to be disinfected are introduced into the disin-



fecting chamber, the steam is turned on in the pipes, and warms the contained air, while steam also escapes into the chamber, and, penetrating the articles undergoing disinfection, quickly raises the temperature to the necessary height to effectually destroy all pathogenic or innocent germs. This apparatus is also portable, but where no steam can be obtained at the place of use, a steam boiler is a necessary attachment.

This is the apparatus used in the public disinfecting station just erected in Berlin. By this apparatus, it is claimed that infected articles can be disinfected in about forty minutes. Of course it is understood that the time of heating up the chamber is not included. The waste steam of one of the public sewage-pumping stations is utilized as the disinfecting agent.

#### DÜSSELDORF DISINFECTING APPARATUS.

[Fleischhamer and Mittenzweig : Viertbjsehr, f. Gerichtl. Med. u. Off. Santsar, Jan. 1886.]

This apparatus was constructed for a public disinfecting station in the city of Düsseldorf, Germany, by Messrs. Walz and Windscheidt of that city. The disinfecting agent is superheated steam. The apparatus consists of a disinfecting chamber, with an internal measurement of 2.5 metres (8 feet) long, 1.5 metres (5 feet) high, and 1.2 metres (4 feet) broad. The infected articles are brought into the disinfector in an iron truck, and the space in the chamber filled with steam. This steam is introduced at the top of the chamber; it is not under pressure, an opening at the bottom of the chamber permitting the escape of the air as the temperature and expansion increase. The steam is superheated by a separate furnace, which heats the walls of the chamber.

The time required to heat the apparatus is from two to two hours and a half. The objects to be disinfected are then introduced, and the chamber filled with steam. The heating then continues for an hour and a half, when the objects can be removed. Experiments made with various pathogenic and non-pathogenic organisms placed in the interior of large bundles (20) of blankets, demonstrated that this time was sufficient for complete disinfection, even in the interior of the bundles. It is claimed that no injury to the materials treated resulted when the temperature in the interior of the chamber was raised to upward of 150° (302° F.).

#### THE STRASBURG DISINFECTING STATION.

(Rev. d'Hygiène, June, 1886.)

In the city of Strasburg a public disinfecting station has been erected, in connection with the municipal hospital for infectious diseases. The disinfecting apparatus is constructed of stout boiler-plate, with double walls, the interspace being filled with non-conducting material. The chamber has a door 3 feet 3 inches wide, and 6 feet 6 inches high at each end. The space between the two doors is 7 feet 6 inches. The disinfecting agent is steam under pressure. The steam boiler is six horse-power. The chamber is also heated by a coil of steam pipe, giving a

large amount of heating surface. The amount of pressure of the steam is regulated by passing the outlet pipe under water. The height of the column of water through which the escaping steam is obliged to pass determines the pressure. This makes an efficient safety-valve. It is estimated that during times of epidemic the bedding of 100 beds can be disinfected in the course of twenty-four hours, at this station.

#### DISINFECTING STATIONS AT BOSTON AND NEW ORLEANS QUARANTINES.

At the Boston quarantine station on Gallop's island, steam under pressure is used as the disinfecting agent. The apparatus is described in Appendix "B" by Dr. Samuel H. Durgin, president of the Boston Board of Health, and a member of the Committee on Disinfectants.

At the New Orleans Maritime Disinfecting Station at Port Eads, a disinfecting apparatus on a large scale is now being tested under the supervision of Dr. Joseph Holt, president of the Louisiana State Board of Health, and also a member of the Committee on Disinfectants. Dr. Holt has promised an extended report of the results of his observations with this apparatus at the next meeting of the Association. The agent used is steam under pressure.

In the foregoing pages an attempt has been made to give a succinct and comprehensive account of the various methods in which heat is applied for the purpose of destroying infectious material. It will be observed that in most of the later forms of apparatus proposed and in use, *steam under pressure or superheated* is the agent used for disinfection. This would indicate that the conclusion reached by the committee in its general report, that steam under pressure is the most efficient and trustworthy non-destructive disinfectant, is based upon practical experience and observation.

#### APPENDIX "B."

##### PRACTICAL EXPERIENCES WITH MOIST HEAT (STEAM UNDER PRESSURE) AS A DISINFECTANT.

By S. H. DURGIN, M.D., CHAIRMAN OF THE BOARD OF HEALTH, OF BOSTON, MASS.

The part I have to contribute to the report of the Committee relates solely to the use of moist heat as a disinfectant in our city and in quarantine.

In the spring of 1885, having concluded to make use of moist heat, we fitted up a room near the end of the wharf at Gallop's island, in quarantine, and within ten feet of where our quarantine steamboat may lie alongside. This room is about ten feet by twelve feet on the floor, and seven feet in height. It is made fairly tight, and has one window, on the inside of which is a thermometer, so arranged as to permit the temperature of the room to be read from the outside.

A hole two inches in diameter is made in the door, into which is fitted a strong rubber hose leading from and connecting with the top of the boiler in the steamboat. Superheated steam is discharged through the hose into the room, and the temperature raised, in about six or seven minutes, to  $230^{\circ}$  F. It may easily be raised to  $250^{\circ}$  or more, but is generally raised to  $230^{\circ}$ , and held at that point for twenty minutes, for the disinfection of any kind of clothing or other infected articles which can be steamed without injury. The articles to be treated are hung about the room loosely, and when removed from the room, which takes place as soon as the heat will allow, are found to be perfectly dry, and not even the polish on the freshly laundered shirts is changed or damaged in the least. Boots, trunks, valises, and all other articles which are made of leather, are quickly destroyed by the high temperature, and should not, therefore, be subjected to this process. Wood-work and paint are also damaged, and all articles which are joined together by cement fall apart.

In any place which is accessible to the steamboat for the supply of steam heat, the process can be quickly applied, easily managed, is without appreciable cost, and its trustworthiness as a disinfectant, when the necessary conditions are complied with, has been well established by Dr. Sternberg and others.

In March, 1885, a company proposing to disinfect rags in the bale by the use of superheated steam, and having secured the confidence of the Board of Health, established a plant in the Charlestown district of our city, close to the Hoosac Tunnel docks, where the Board of Health permitted rags in bale to be sent for disinfection. The requisite furnaces, boilers, and steam pipes for making and delivering moist heat at a very high temperature were provided. Strong boxes, large enough to contain one bale each, with hollow perforated screws, four or five feet in length, passing within and fitted to one end of the box, were arranged. Everything being ready, the Board of Health was notified, and the following process witnessed: The screws were set in motion by steam power, when a moderate pressure of the bale of rags against them was sufficient to draw the bale into the box on the perforated hollow screw. This being done, the end of the box was closed tightly, and the steam discharged through the hollow screw into the centre of the bale. A pyrometer situated on the box and reaching within indicated the temperature of the steam after escaping from the bale of rags at  $300^{\circ}$  F. After three minutes the pressure was relieved by an exhaust, the box opened, and the bale removed, when the hot steam appeared to issue from every square inch of its surface. Not only did appearances favor the belief that this was a perfect disinfection of the whole bale of rags, but the experiments of eminent bacteriologists had already shown that disease germs of the greatest resisting power had been sterilized within the bale of rags which passed through this process. I then certified my belief that this process was effectual in its power to disinfect bales of rags. A few days later, in the month of April, I made another examination of the process by thrusting my fingers into various parts of the bale immediately on its removal from the steam-



box, when to my surprise I found bunches of rags perfectly cold, while rags within two inches of them were intensely hot. This fact was communicated to the management, when greater heat and longer time was ordered and used.

In the month of May, 1885, another examination was made, Dr. Smith, health officer of New York, Dr. Raymond, health commissioner of Brooklyn, Dr. Abbott, of the Massachusetts State Board of Health, Drs. Griffin and Cogswell, our port physicians, and the city Board of Health being present. At this time, the degree of the moist heat used was 350° F., and the time allowed to each bale was four minutes. When the bales were removed from the steam-box, they were immediately examined with the fingers squeezed into the bale through holes cut in the sacks. The fingers generally came in contact with heat too intense to be borne for a moment, but by persevering the cold places were found and examined by the gentlemen present. It was subsequently determined by the managers of the process to use a higher degree of moist heat, and to expose the rags to it for a longer time. Much unfavorable criticism of this method of disinfecting rags had then been provoked, and the question as to whether thorough disinfection could be accomplished in this way was being seriously discussed.

In August, 1886, I made another examination. I found at this time moist heat being injected into the bale at 500° F., as indicated by the pyrometer just before entering the bale, and the time given to each bale was eight minutes, a slight exhaust being allowed from the box all the time. I examined three bales as they were removed from the steam-box, and although with more difficulty than on previous occasions, yet the cold places were found by the use of the fingers within the bale, and witnessed by the overseer.

I was informed by the overseer that a large number of bales had been set on fire by this last method, and that water had been required to extinguish it.

The works were closed up in August, and have not since been operated. The conclusions to be drawn from these experiences seem to be that the moist heat passing from the centre to the surface of a bale of rags must encounter knots or bunches of rags varying in degrees of density and of resistance to the penetration of heat; that while the temperature of the principal part of the bale is raised to a degree far above what is required for disinfection, other parts of the bale are found to be wholly unaffected by the heat; that anthrax bacilli having been killed and metals melted at 240° F. within bales of rags subjected to this process, are facts not inconsistent with the experiences here given, and do not prove the disinfection of the whole bale. The degree of heat, the amount of pressure, and the time necessary for moist heat to penetrate and raise the temperature of *all* parts of a bale of rags to a degree necessary for disinfection without burning the rags, have not yet, so far as I am aware, been declared.

# PROCEEDINGS AND DISCUSSIONS AT THE FOURTEENTH ANNUAL MEETING,

HELD AT

TORONTO, ONT., CANADA, OCTOBER 5-8, 1886.

TUESDAY, October 5, 1886.

The fourteenth annual session of the American Public Health Association was called to order by the President, Dr. Henry P. Walcott, at 10 o'clock A. M., Tuesday, October 5, at Toronto, Canada, being the time and place agreed upon by the Association at its last meeting.

The PRESIDENT.—Gentlemen of the Association: The hour of 10 o'clock having arrived, the Association will please come to order. The exercises of this Association will be opened with prayer by the Rev. Dr. Parsons.

Prayer having been offered,—

The PRESIDENT.—The first thing in order will be the announcement from the Local Committee of Arrangements by Dr. Bryce, chairman of that committee.

Dr. P. H. BRYCE, of Toronto.—Mr. President, and Gentlemen of the Association: It gives me great pleasure indeed to state on behalf of the Local Committee of Arrangements that a programme for the week has been completely arranged, so that I think that both the gentlemen from the other side of the line and those from Canada will find that they can proceed from one point to another, both in the work and in the city, with perfect facility. Starting with this morning, I may state that in this building will be found for the future, during the meeting of the Association, the offices of Dr. Watson, the secretary, and Dr. Lindsley, the treasurer; and that all applicants for membership will be kind enough to fill out the blanks, which they will find at Dr. Watson's office, and those blanks thus filled out will be presented to the Executive Committee. After their acceptance, gentlemen will please proceed to Dr. Lindsley's office, pay their fees, and get their badges of membership, which, of course, entitle them to all the privileges of the Association. I presume that is the first point upon which everybody ought to be informed: these offices are up the stairway, and to the right side of the hall. Regarding the programme for to-day, I have been in slight error myself, and I will only say here that there are but two sessions instead of three, as last year at Washington, the first session beginning at 10 o'clock in the morning, and the next session at eight in the evening. To-morrow and on Thurs-

day afternoon the afternoon sessions will be replaced by an entertainment by the mayor and the city. This evening the Association will not meet in Shaftesbury hall, but will meet in the Normal School building; and by referring to the little Guide-book, copies of which will be supplied up-stairs in the office of the treasurer, you will see that it is only necessary to take a Yonge-street car as far as Gould street, and go one block to the east, where you will find the Normal school. The buildings form one whole block by themselves, and everybody will be able to find them without difficulty. At that building, then, to-night a reception and *conversazione* will be given by the Minister of Agriculture and Health, and at the same time the President of this Association will deliver his annual address. The *conversazione* had of necessity to be limited as to number, as the hall, though capacious, is not of the largest, and in order to make entrance to it the privilege of members, as well as of others interested in sanitary matters, tickets will be issued at the office of the treasurer to all members who have received their badges. Each ticket entitles a gentleman to take his ladies with him, and these tickets are to be presented at the door. Regarding the Canadian delegates,—some of whom may not be joining the Association, although I trust that in no case will any official delegate appear at the Association without showing his hearty interest in the work by joining it,—I may say that they will likewise receive tickets for the *conversazione* to-night on application up-stairs and the presentation of their certificates as official delegates from any part of the province. To-morrow's meeting is an all-day meeting, and will be held here. Thursday's meeting will be held here, with the exception of the afternoon, which will be devoted to the entertainment by the city. Carriages will leave the Rossin House corner, and members will be driven to different parts of the city. I may say, in connection with another matter which has received a great deal of attention from the Local Committee, that arrangements have been made by Dr. Covernton, chairman of the Reception Committee, by which the ladies visiting Toronto as friends of delegates are to be received, in the first place, this afternoon at the Royal Canadian Yacht Club on the Island. Ladies will call at the Rossin and Queen's hotels, where the lady friends of delegates may be stopping, and conduct them to the Yacht Club wharf, whence they will take them to the Island; and after refreshments there, I believe, if the weather permits, there is to be a sail on the lake in one of our large yachts. To-morrow afternoon, according to arrangements made by the Ladies' Committee, all the ladies visiting the city with members of the Association are to be received, I believe, in the Rossin House parlors; and in order to facilitate the work of this Ladies' Reception Committee, I would respectfully ask all the gentlemen here, who may have ladies visiting with them, to ask their lady friends to have their cards presented either here, the most convenient place, or to one or other of the members of the Local Committee, so that the Ladies' Reception Committee will know on whom to call. I know of no other points that require to be mentioned at present; but I may say that there are a number of the mem-



bers of the Reception Committee always present, either here or in the other room, and other information will be gladly given by them to any who may ask for it.

The PRESIDENT.—The next business in order is the report of the Secretary.

The SECRETARY.—The Executive Committee have recommended the following names for membership. (The names of the applicants were read.)

On motion, the gentlemen whose names were read were declared to be elected members of the Association.

Dr. R. HARVEY REED.—Mr. President, I want to inquire if anything has been arranged with regard to the meeting of the Advisory Council. I believe a report has been made about that, and I would like to know when we are to meet, so that our meetings may not conflict with other work.

The PRESIDENT.—An announcement will be made on that subject later.

Dr. WM. CANNIFF.—Mr. President, I would call your attention to the fact that there has been no distinction made in the election of members as to the different classes of members. Some are elected as active members, and some as associate members, and it has been suggested that a distinction ought to be made.

The PRESIDENT.—That distinction appears upon each application for membership, and is also carried into the action of the Executive Committee upon it. The report of the Treasurer will now be presented.

The report was then read by the Treasurer, Dr. Berrien Lindsley. (See report elsewhere.)

On motion, the report was received, and referred to the Auditing Committee, who were appointed by the President as follows: Dr. Devron, Dr. Reed, and Dr. Hibberd.

Dr. J. N. McCORMACK, of Kentucky.—I move that the ex-presidents of the Association be invited to seats on the platform.

Dr. GUSTAVUS DEVRON.—I second the motion.

Motion carried.

The PRESIDENT.—I hope that in accordance with the motion just passed, those ex-presidents of the Association who are present will take seats on the platform.

The PRESIDENT.—It does not seem that the ex-presidents feel inclined to comply with the expressed will of the Association. It will be a favor to the Association if Dr. Workman, of Toronto, and Dr. Russell, of Glasgow, will honor us by taking places on the platform. (The gentlemen named took seats on the platform.)

The PRESIDENT.—The next business in order is the reading of a paper on "Destruction of Night-Soil and Garbage by Fire," by George Baird, M.D., Wheeling, W. Va. As Dr. Baird is not present, ex-President Dr. James E. Reeves has kindly consented to read the paper. (See page 119).

The PRESIDENT.—As this paper is sufficiently distinct in its character, and stands alone on that subject, it has been decided to open the whole discussion upon it at once, reserving the three following papers for another group, to be followed in turn by discussion.

Dr. GUSTAVUS DEVRON.—There is one important factor in any plan of sanitation that may be adopted by any large city, and that is its cost; so that any city requiring a system of sanitation may know whether it is able to produce it. As the writer of the paper is not present, perhaps Dr. Reeves could give us some information on that point.

Dr. JAMES E. REEVES, of W. Va.—The contract for the building of this furnace is not to exceed \$2,500, and, as the writer of the paper has stated, no pay is expected until the furnace has been put to its most extreme test. I may state that the facts detailed by the writer of this paper are well known to every citizen of Wheeling, and that so far the method has been an entire success,—so entirely a success that I believe it is the solution of the difficulty for the future.

Dr. GEORGE M. STERNBERG, U. S. A.—I consider this subject a most important one indeed, and I am glad to hear that the experiment referred to has been made in Wheeling. I trust we will have a full report of the results of that experiment at the next meeting. Certainly it is hardly worth while discussing the paper at present. The paper itself gives a very full statement of what has been done, and we will wait, I have no doubt with great interest, for further information as to its practical effect.

Dr. JAMES E. REEVES.—I should feel very much complimented by a recommendation of my neighbor's performance, and should be glad to know if it is the pleasure of this Association to request Dr. Baird to pursue the subject further and report.

Dr. GEORGE M. STERNBERG.—I think it would be of great interest to pursue the investigation further.

Dr. ALBERT L. GIHON, U. S. N.—I would suggest that, following our usual course, we should appoint a committee, of which Dr. Baird might be Chairman, to investigate the matter, and report in due form at the next meeting. We would then be able to publish the report of the committee in the form of a monograph, which I hope will continue to be a feature of our proceedings. I therefore move that a committee of five be appointed to continue the inquiry into the subject of the "Destruction of Night-Soil and Garbage by Fire."

A DELEGATE.—I second the motion.

The motion was put to the meeting, and carried.

Dr. ALBERT L. GIHON.—I move that Dr. Reeves be appointed chairman of the committee in the absence of Dr. Baird.

Motion seconded and carried.

Dr. F. N. BOXER, C. E., of Montreal.—As the system of destroying garbage by cremation has been adopted in the city of Montreal, I regret that Dr. Laberge, the health officer of that city, is not present, as I am sure he would be able to give valuable information on the subject, and I would suggest that his name might be added.

The motion, amended in accordance with the suggestion of Mr. Boxer, was carried.

The PRESIDENT.—How shall the rest of the committee be appointed?

On motion, it was agreed that the Chair appoint the other members of the committee.

The PRESIDENT.—The next paper in order is one on "Our Inland Lakes and Rivers, the Disposal of Sewage, and the Spread of Infectious Diseases," by Edward Playter, M.D., Ottawa. (See page 123.)

The PRESIDENT.—The next business will be the reading of a paper on "Toronto Sewers," by Alan Macdougall, M. Inst. C.E., F.R.S.E., Toronto. In the absence of Mr. Macdougall, the paper will be read by Dr. T. S. Covernton. (See page 41.)

The PRESIDENT.—His Worship Mayor Howland, of this city, is in the hall, I understand, and I should like him to come to the platform. The next order on the programme is a paper on "The Influence of Sewerage on Health," by William Oldright, M.A., M.D., member of the Provincial Board of Health, Ontario, Toronto. (See page 156.)

The PRESIDENT.—The subject of these papers is now before you for discussion.

Dr. E. W. GERMER.—I agree with one remark of the last speaker, and that is that plumbing should be conducted on some systematic plan. The plumber is generally to blame in these matters, though I agree with Dr. Oldright that they are not always to blame. The reason I asked about the pumping station is this: We all know that in Chicago they built a sewer and a crib; they went out for miles into the lake, and after the work was completed, they had a great celebration about it; they made speeches, and had great rejoicing. But what do we find to-day? We find that if a Chicago man is thirsty, and a glass of water is presented to him, he looks at it, and shakes his head, and will not drink it. (Laughter.) He sees so many things in it that he acts as if he had hydrophobia. (Laughter.) It required the services of some good practical engineers, and the expenditure of a good many thousand dollars, to find a way of keeping the sewage out of that crib which they opened with so much celebration. They found that when they got rid of the sewage, about one half of it came back again in the water they drank. The city of Pittsburgh had great trouble about typhoid fever, and their experience was pretty much the same. They were pumping their water-supply from the Monongahela river; the water looked bad, and even a blind man could see that it was bad. (Laughter.) Above the point from which they obtained their supply there was a school-house with 400 children, and a livery stable with a large number of horses, the sewage of which was discharged into the river. They had three chemists to make analyses, and they were surprised to find a large quantity of ammonia in the water. How did it come there? Well, I was not there half an hour before I saw this livery stable with 130 horses in it, and I asked them if it was any wonder that they found so much ammonia in that celebrated Monongahela water. They had a similar experience in Plymouth,



Altoona, and other places. All this goes to show that, while systematic plumbing is all right, we should also have along with it a systematic building of sewers, and a proper system of water-works. As I understand it, there are a number of currents in the lake opposite Toronto, but the general tendency is in one direction.

Dr. WM. OLDRIGHT.—Yes, but very little ; the current is very slight. Some think the Niagara river has an influence in the formation of currents, and the winds have a strong influence also ; but the point is to get sufficient experimentation to find out in what direction the currents actually tend.

Dr. E. W. GERMER.—And supposing the wind comes from the East, it will drive the sewage right up to the intake, and it will be pumped up again.

Mr. W. H. HOWLAND, Mayor of Toronto.—Mr. President, and Members of the Association : I stand before you to-day as a miserable layman, without a bit of pretension to a fraction of the scientific knowledge which I know is so largely possessed by members of this body. But as mayor of the city, I have taken some pains to understand the explanations of those gentlemen possessed of the technical knowledge, who have taken up this question, and for that reason I may be of some assistance in telling you the grounds upon which our engineers have adopted a certain course : more than that you must not expect of me. I feel very anxious to-day on this question, because to-morrow it is to be voted upon by the people of this city. You all know the immense difficulty there is in getting through any city council, or any body like it, a great scheme such as the one now before us, involving a large amount of expenditure, and involving what nine tenths of them regard as merely sentimental considerations. I have been fighting this thing for a year, and I have got before them the principle of a trunk sewer ; and I am sorry to say, that just on the eve of the vote, I find those, whom of all others I expected would support the scheme, are expressing, without intention I am sure, opinions which, as the minds of so many people in a matter like this are influenced by the merest trifles, will have the effect of influencing adversely perhaps thousands of votes. Now, I am perfectly content that if this scheme is not right, this body, who have a knowledge of these matters, should so decide ; but I wish them to do so only after a full knowledge of the facts upon which the scheme is now proceeding, and these facts, as supplied to me by those who have a technical knowledge of such matters, I will endeavor to give you. Our position is this : That the sewage of 120,000 people is discharged into that bay ; that there is little or no doubt that it pollutes our water-supply ; that it is drawn up again to the city ; that the whole summer through it at least poisons the atmosphere, and becomes an element of very great and imminent danger to the public health. There is one point touched upon by Dr. Oldright as to which Dr. Canniff, the city medical officer, has given me some additional information. Dr. Oldright stated that for four years past the average death-rate was 20 per thousand. He might have stated, as Dr. Canniff

tells me, that last year it went up from 20 to 33 per thousand; and I know that during the past year there has been an increase, even in the pest-houses of this city, in the number of cases of diphtheria, and that that disease has been really very severe in Toronto. It seems to me that an increase of three per cent. in one year in the death-rate of a city like this, and that largely in diseases of the character which you regard as preventable, is a pretty certain indication of where we should look for the cause. If you notice, there is a pipe which goes across the bay to the intake crib; that pipe is anything but perfect, and we are taking in and distributing to the city water which is really a mixture of lake and bay water. At the intake crib, on a stormy day, there is no doubt that we take in water from the inside of what is known as Hanlan's basin in the harbor, and some from inside the water-works pumping-house. Now, that water at the pumping-house is simply a mixture of the other two, and that is what we are drinking. It struck me that what the Toronto people wanted was to get that stuff out of the bay as quickly as possible, and to put it away from them as far as possible. The lake was a thousand times better place to put it than to leave it there. I had been working to that end, and the law says we must bring forward a systematic plan, crystallize it into a by-law, and have it voted upon. We got a plan from the best engineers; we brought on for the purpose Mr. McAlpine, of New York, at a large expense; we took Mr. Kivas Tully, a man who has observed these things here for the last thirty years; and we had our own city engineer, who has also been studying the matter for some time,—and these two other gentlemen were associated with him. They figured the matter out; they took it on a basis of a population of 300,000, and they decided that in this plan there was fall enough to carry the sewage out. Now, in this main sewer we start with a fall of fifteen feet, which is preserved all the way, while on the other sewer we have a rate of five miles of flow to the hour. That is kept up all the way. Now, they say, understanding, as they do, these laws of physics, that there is force enough there to drive this sewage out into the lake; that it has got to go; that nothing will stop it. And when they bring up this argument about the water-supply, they assure me on their professional reputations that this force will be sufficient to clear it. I was over in Buffalo, and I saw there a sewer which I believe was bungled in one particular, and that was with regard to the syphon. But it has a fall of only four feet in five miles, as against a fall here of fifteen feet; but they say over there that that sewer runs like a mill-race, and carries the sewage out into the water. The engineer there said that the power was abundant, that all that was wanted was direction, and that having once obtained that, an inch would answer as well as a foot. Of course these things I do not know myself: they are brought before me by engineers who do know: but at any rate that is the position. They say the power is there to take it out; they use the common illustration of putting a pipe in a tub of water, and they say that if you give it the incline and fill it up with water, the water is bound to go through. We do not touch the level of

the water until we go to the lake. Mr. McAlpine studied the matter, and he said, "I am going to strike a point at which it will be safe to deposit the sewage." He took the point, and then went out and ascertained the temperature of the water. He looked into the matter, and he said that Lake Ontario's trend is eastward; and he said, "If you throw solid substances into any of these slips, you will see that the trend is eastward." He said that all the rivers, and so on, are taking that trend; the direction of the water is steadily eastward through all these lakes and rivers, and it must go on down to the St. Lawrence and the Gulf. He said that anything you get on that slope must go east; it belongs east, and it will go that way. Now, he said, "I am going to put that pipe thirty feet below the level and ten feet from the bottom," and he said "I find that the temperature of the water at that outfall is  $46^{\circ}$ . I will take that stuff and throw it out on the lake bank. I claim that the sewage of the city will pretty nearly go out there before there is any start of decomposition at all. I am going to throw in that heavy stuff: it will go down that bank, and at that temperature it cannot decompose. The lighter matter, at a temperature of from  $56^{\circ}$  to  $60^{\circ}$ , is going to come to the surface, and it is going to be disseminated. I will take it," he said, "four miles from the intake, and it will disseminate, and we cannot help it. If an easterly storm comes, as this matter will be down at a depth of twenty feet, it will never trouble you." We have, down a little to the west, the village of Parkdale, and when the river Humber is disturbed, making the water muddy, you find that not a gallon of it comes round that bay, and you never see the current of the river turned eastward, so as to run any danger of contaminating the water in the crib, although it enters a current which flows past it. There is the fact that that sewage travels in the same line as the river current trends, and still with the closest examination of the intake crib they have never been able to discover any sewage there. It is on the direct current which is always to be found there. There is another point to which I wish to direct your attention. It is going to take us five years to do this work, if we go on. We are not going to get that piping laid down until the end of five years. If there is any better scheme, or if we discover, as we will be able to do the first year, that there is any difficulty such as has been suggested; if we find that the sewage is floating around in the direction of the intake, then we have four years in which we can modify that part of the scheme, and there is nothing to bind us to do a stupid thing, as this would be under such circumstances. But just as the thing stands to-day, I believe that it is a perfectly good scheme for us citizens of Toronto. But, gentlemen, I am in the deepest trouble about it that ever any man was in this world. I have forced the thing so far in the first year, and I hope we shall have a deliverance from our present plan of taking this miserable stuff out of the bay; I hope we shall be delivered from it, and that we shall have a sewerage system adopted by the people, and bound to be carried out to a certain measure of permanence. But if this by-law is defeated, the opponents of an improved system will tell you that there is no use for you



to bring in another measure ; that the people are against it. Every alderman in the council will say that of course the people are against it, and it will very likely take ten years to get the reform as far forward as we have it to-day. I am as anxious as any man can be to get this thing done, and if I am beaten—well, I was going to say that I would sit down and cry : but I will try it again. But I can assure you that I am full of trouble about this matter [laughter] ; and if there is anything that will keep me from sleeping, it is the thought of any more of that stuff going into our harbor. Some doubt has been expressed on account of an expression in the report as to the certainty in the minds of these engineers about this outfall being sufficient to carry out the sewage. Let me say that there was no doubt on that matter. Mr. Sproat himself was a little timid, and wanted it carried out further ; but Mr. McAlpine and Mr. Tully say that it is rank folly to take it an inch farther ; that if they were in a position where it was required, they would swear to its safety. But our own engineer, who is a first-rate man, but who, as I said before, is a little timid, said, “ Carry it out further, and spend another \$250,000.” Now from that expression of his opinion, and in order to make it a part of the scheme, they agreed to carry it a mile farther and to spend this additional amount of money, the distance being nearly five miles away from the intake crib. In the meantime we are drawing up and distributing through the city and drinking this water, and increasing the ratio of death, largely from these preventable diseases, three per cent. in one year. At present, we are really in a terrible shape, and if anything like an epidemic disease were to break out among us, I really believe that the sickness would amount to a pestilence. I think that last July Dr. Canniff told me that the increase in the death-rate that month was enormous. I forget the figures, but perhaps Dr. Canniff will tell us.

Dr. WM. CANNIFF.—It went up to about 31 to the thousand.

Mr. W. H. HOWLAND.—That, it seems to me, was getting pretty near a pestilence.

Dr. WM. CANNIFF.—I have the figures from the *Canada Health Journal*, published by Dr. Playter, and according to the same authority the death-rate has risen to 25 per thousand this last year.

Mr. W. H. HOWLAND.—That means that some 700 or 800 people are annually dying in this city more than should die. These other towns along the lake are remarkably healthy : Hamilton, for instance, which is situated on an enclosed bay like our own, has a death-rate of only 18 per thousand. This province, which largely consists of a series of peninsulas, over which the lake breezes from Lakes Superior and Huron, Georgian bay, and so on, are blown, should be remarkably healthy, especially such places as Toronto, and others on the lake shore ; and yet we find that the inland city of Brantford has a death-rate of only 15 to the thousand. I do not think that this city, if it were protected by a proper sewerage and sanitary system generally, should have a death-rate higher than 15 or 16. I hope, Mr. President and Gentlemen, you will excuse me if I am too earnest. I am merely giving you what has been

told me ; and, as I said before, I feel very anxious about this matter of a trunk sewer, and I shall await your expression of opinion with great anxiety. I know our friends of the Provincial Board of Health did not mean to cast a doubt upon the scheme. I know that they want a trunk sewer, and that they did not intend to do that which may result in our losing the chance of getting a trunk sewer when they gave expression to their opinion in the matter. In conclusion, I would simply appeal to you to aid me in this matter with your knowledge and information. You can be of the greatest service to this city, if you will come forward and deliver us by a declaration of opinion, which may have the effect of influencing many votes on this by-law. Gentlemen, I thank you for the kindness and patience with which you have listened to my remarks. [Applause.]

Prof. H. A. JOHNSON, of Chicago.—There are some points in this problem which have interested me very much, and which I would like to mention, as they bear especially on the pecuniary aspect of the question. We have been told that the death-rate of Toronto is something over 20 per thousand ; that it goes above that point in some seasons ; but, taking the year round, that it reaches pretty nearly 21 per thousand. Now the people of this city are about to decide on a question which has an important bearing on this death-rate, and it is perfectly certain, I think, that if they can be brought to see it from the standpoint of political economy they will decide wisely. Perhaps they ought to decide wisely from the standpoint of sentiment, when we see here quite certainly 300 human beings every year dying in this beautiful city of Toronto who ought not to die. That should move them. I am quite sure that the death-rate of Toronto, under the present state of sanitary knowledge, with the means which we have at hand for preventing disease and death, ought not to be more than 18 per thousand, and it should be reduced lower even than that. But the fact appears to be that we have at least 300 deaths annually in Toronto which should not occur. Now, that appeals to a good many homes ; it is of interest to a great many people and to many families, and still, when you speak of it in that way, it does not amount to very much in the way of influencing votes. People may say that they regret that these 300 people should have died last year, who ought to have lived ; but if they are asked to expend \$100,000, or \$200,000, or \$300,000, they say they cannot afford it. Now human life is worth something from the standpoint of political economy, but the trouble is to get the problem before the people, and to show what it really means in dollars and cents. The difficulty is in the fixing of the pecuniary value of those lives. In the neighboring republic we had a few years ago a standard of value for human life. I have seen men and women sold at an average of about \$1,000. We do not do it now ; but we have done it, and it was a standard based on the actual value of muscles and bones and nerves in the production of those things necessary to satisfy human wants. Now at \$1,000 each, it would amount to \$300,000—that value added to your cemeteries every year : certainly not a very profitable investment. Take

half of that, and you have \$150,000; you have extended your cemeteries without beautifying them, or adding a single attraction for the eyes of the visitors to your city. But there is another problem. According to the estimate of sanitarians of the loss by disabling sickness, the death of these 300 people would represent an actual loss to the community of \$250,000 annually; or for two years of sickness among your laboring men, your professional men, your wives, your daughters, your friends who come here to visit you, it would amount to \$600,000. Now that means something in money, and all the money which you propose to put in this sewer will come back to you in this saving of life and this saving of doctors' bills. Perhaps I should not refer to that point, but I am willing to contribute my share of that in my own city, and I have no doubt the physicians of Toronto are willing to do so here. It means the saving of so much money from the undertaker; it means the putting it where it is better and more beautiful than roses in your garden—in the bloom of health on the faces of your loved ones. Two years of sickness for each death: 600 years of sickness, and its worth in money. Take the value of a day's wages for an average man: estimate it in that way, and I leave it to yourselves to add up. One year of life, one year of health in the city of Toronto, saved by methods which are known to science, by methods which sanitarians know how to use, will bring back the taxes and put down those sewers, put in these various improvements, save those lives, and save your people from this disabling sickness. According to the statistics which have been given us, you have about 100 deaths a year from typhoid fever. That is a disease which should not occur in a civilized country. It is a disgrace to a civilized community,—not to Toronto alone, because we have it in Chicago to a considerable extent; but I say that it is a disgrace to any civilized community, because typhoid fever is a preventable disease. The percentage of deaths to cases of that disease varies, of course, according to climate, habitat, and other conditions: but supposing we say it is ten per cent. I do not think myself it has that mortality; but let us take that figure,—and you had 1,000 cases of typhoid fever in your city last year. Now the statistics of mutual aid societies show that the time of disability of typhoid cases, the time in which recovery is made, is from ten to thirteen weeks,—generally about three months. Here, then, you have 900 cases, each of them being disabled for at least ten weeks at the lowest estimate, making 9,000 weeks of disabling sickness in one year from a preventable disease. Few of these patients are either very young children or old people, so that the victims of this disease are generally at a period of life when their services are of most value to themselves, their friends, and the community at large. Now figure up how much those services are worth a week, even at servant girls' wages, and you will arrive at one way of showing the pecuniary value of sanitary improvement. Your city is beautifully located; you have at hand the means of making it one of the most healthy cities in the world; and I believe your people will adopt those means, with the conviction that the money which they spend in carrying away



the waste products incident to life, and supplying the population with pure water, will be money well invested, money largely represented by human life and human labor.

Dr. J. H. RAUCH, of Illinois.—From the remarks we have heard, and the papers which have been read, I am satisfied that the construction of a trunk sewer is a sanitary necessity for the people of this city.

Mr. E. C. JORDAN, of Maine.—I think the fact that Mr. McAlpine has committed himself so distinctly as he appears to have done to the necessity and the safety of this scheme is a sufficient guaranty against the dangers which have been mentioned in connection with it. He is an engineer to whom we have all looked with respect and confidence, and, so far as the hydraulic problem is concerned, I do not think that should give the people of Toronto a moment's concern after the decision he has arrived at. So far as the question of the pollution of the water-supply is concerned, that should be another thing; and upon the question of the law which governs the currents of the lakes, he would also be an authority.

Dr. R. HARVEY REED, of Ohio.—I do not think there is any question with regard to the necessity of a trunk sewer in Toronto. The only question, it appears to me, is the question whether, under the plan proposed, the sewage is going to contaminate the water-supply of the city or not. That is a vital question, one of the greatest importance to the people of Toronto. There is no doubt that they should have a trunk sewer, which would carry the sewage further away than it is carried at present; and the question then is, whether in the present location of the outfall it is going to prevent the pollution of the water they are going to drink in the future. That is a question which it is difficult for this body to determine. We must take the reports of engineers whom we believe to be capable, whom we know to be experienced, in determining questions of this kind, and as we have had the reports of such men, who say that the point indicated on that map is a safe point for the outfall, the only thing we can do is to put the scheme in operation, and determine by experience whether their opinion is a good one or not. We can suggest a case; we can all come to a conclusion in that direction; but we cannot determine it absolutely from the experiments reported here to-day whether the sewer will contaminate this water or not. I think there can be no question as to the necessity of a trunk sewer.

Dr. GUSTAVUS DEVRON.—I would say, in my dual capacity as member of the State or Central Board of Health and of the New Orleans Board of Health, that even admitting for argument's sake that the system now proposed is not as perfect as it might be, it will take time, as has already been remarked, to determine the question absolutely, and it is important that it should be so determined, in view of the carrying out of any future improvements that may suggest themselves. More than that, even if the cost of the experiment is objected to, I say this, that the experiment is for the purpose of prolonging human life and lessening the amount of human mortality; and any effort in that direction, cost what

it may, is a praiseworthy one, and is the duty of any government towards its subjects and its citizens, who are entitled to life, liberty, and the pursuit of happiness. Life without health cannot conduce to happiness, and the government is entitled to give us health if it possibly can; for what is the propriety of preserving our property, if they do not give us life and health with which to enjoy it? Under the circumstances, I think the city authorities should not hesitate in adopting the system recommended by the engineers, which can be modified by means of engineering and other scientific skill, with a view to make further improvements in the near future.

Prof. H. A. JOHNSON, of Chicago.—It seems to me that there can be no question among us as to the necessity for a trunk sewer, nor as to the absurdity of continuing to pour the sewage of the city into the bay with the imminent risk of polluting the water-supply.

Dr. E. M. HUNT.—It seems to me that the authorities of this city have adopted the wisest possible course in procuring the best expert advice upon this question, and selecting men of world-wide reputation to give an opinion upon it. The question was asked of me last night, Is not Mr. McAlpine only a civil engineer? But do you think any man would risk his reputation by giving an opinion in a matter of this kind, and leaving out the sanitary considerations which are involved in its determination? Do you think such a man would come here to Toronto and propose an outlet for a sewer, which by any possibility would result in the contamination of the water-supply? When his worship the mayor pleads the case in the way he has done, and shows the points better perhaps than any medical expert could have shown them, he carries conviction to my mind, basing his statements, as he does, on the fact that the city had obtained the best expert advice. I say that physicians should hesitate long before doing anything which would interfere with the expert opinions given by these engineers, backed up by the arguments presented to us this morning by his worship, and by the fact that, even if there is the slightest possibility five years hence of this question of the outlet requiring to be changed, that part of the scheme can be thoroughly overhauled. In my own city we had a question of this kind before us, and we had the medical men hanging back for a long time, and expressing doubts on the matter; but they finally gave in to the opinions of those experts who had been consulted in the matter. The tendency of the physicians was to say, "This will not do; this outlet is too near;" and they postponed the matter by not submitting, and I do not propose advising any other city to commit that error.

Dr. J. J. CASSIDY, of Toronto.—I desire to make a few remarks on this question of a trunk sewer system. It has been a subject of discussion by the Provincial Board of Health, and we have received a report upon it from our Committee on Sewerage, one member of which, Professor Galbraith, is a practical engineer, and one who has devoted a good deal of attention to this matter. In discussing a matter of this kind in the board, we felt that it was only fair that we should look upon it not merely as

citizens, but as sanitarians; and we felt also that before asking the citizens of Toronto to endorse these plans, we should feel assured that they were perfectly right, both from a sanitary and an engineering point of view, and these conditions being complied with, then we would be satisfied as citizens. We felt that the report which we had before us last night was not of such a nature as should induce us, as sanitarians and citizens, to admit that the proposed system of sewerage was a good one. We are prepared to admit all that has been said by Dr. Johnson; nobody can object to it; in fact, I believe it is admitted on all hands that it is most desirable that we should have a trunk sewer. The present question is largely a question of engineering; and the question for us was, Is this system which has been submitted to us one which, if completed, will accomplish all that its advocates claim that it will? Under the circumstances, I say it is a difficult thing for a body of strangers, such as the members of this Association are, coming here from all parts of North America, and having a question like this suddenly sprung upon them, to decide whether the system would really accomplish all that is claimed for it, or whether the matter was one which required further consideration. As to the general question of a trunk sewer for the city, I believe there is a pretty general feeling that such a thing is a necessity; but we have not had sufficient evidence before us as a Provincial Board of Health to convince us that this one particular system is a good and thorough one. I do not wish to enter into the engineering question, as I am not capable of entering into it, but I merely form my opinion on the data which were placed before me, and on which we as a board came to the conclusion that we could not recommend the city to adopt the proposed system.

Dr. WM. CANNIFF, of Toronto.—I am sorry to have heard the remarks of Dr. Cassidy with regard to this question of a trunk sewer. As medical health officer of this city it has been my duty to consider this matter from year to year, from month to month, and almost from day to day, and during the three years I have been in office I have repeatedly taken pains to point out the necessity of some improvement with regard to the sewerage of the city. No one who is about here in the summer, and goes on that bay, or sees the water, can avoid coming to the conclusion that that water is polluted; that there is a great deal of sewage mixed with it; and if you examine it during the winter, you will notice in the slips which we have along the front of the city quantities of solid excreta appearing on the surface. You will find, particularly in hot weather, that bubbles of gas are constantly coming to the surface, and large quantities of excrementitious matter; and you need hardly be told that where you have gases emanating in this way from decomposing faecal matter, it is of the most deleterious character to the public health. On the other hand, we have in the city a large number of tenement-houses where they have no drainage, where their slops are thrown into the yard or into the privies, of which we have too large a number, and the excrements of man and beast are thrown back into the soil, simply because we have



not a proper sewerage system. Now in the face of this polluted condition of the bay, and this want of sewerage; in view of the fact of the increased mortality,—and I may say that only a few days ago I had to close up one of our public schools, as there had been no less than fourteen cases of diphtheria reported among the school children, and four deaths,—I say in face of these facts, it behooves the people of Toronto, and this Association, to give an expression of opinion as to the necessity for making some additional provision for the disposal of the sewage of this city. Now I am not an engineer, and I do not pretend to offer an opinion on a question of engineering; but I do maintain that the testimony of an engineering expert should be taken without question. Some people seem to have a difficulty in accepting the authority of Mr. McAlpine, which, I think, is a great reflection on a gentleman of his standing;—and when he gives an opinion, and when our own engineer, Mr. Brough, and Mr. Tully also, declare that this scheme is a feasible one, it does not become medical men to call in question their opinions on such a subject. Dr. Rauch, who is a celebrated sanitarian, has expressed a very decided opinion on the subject, and I hope that the Association will also, as an Association, declare its opinion in the matter.

Dr. C. W. COVERNTON.—I wish to repudiate very distinctly, on behalf of the board of health, the idea that we are not desirous of doing everything in our power to bring about the accomplishment of that reform in the sanitary condition of Toronto which we all feel to be so necessary. As I understand it, our opinion was not intended to have any such effect as that of preventing the accomplishment of such a reform. We merely maintained that the question of the outlet should not be absolutely decided at present, but should be reserved as a question for future consideration.

Dr. BENJ. LEE, of Philadelphia.—I beg to offer the following resolution:

*Resolved*, That it is the sense of this Association that the construction of a trunk sewer is a sanitary necessity to the city of Toronto.

This resolution does not commit the Association to any particular scheme, but it does commit the Association to the opinion that the present condition of affairs is a dangerous one, and that a trunk sewer in some form should be constructed.

Dr. WM. OLDRIGHT, of Toronto.—I have much pleasure in seconding the resolution, and I should like to have the opportunity of saying a few words upon it before the discussion is closed.

Dr. EDWARD PLAYTER, of Ottawa.—In times past I have felt a large amount of interest in this question of a trunk sewer, and though I am not now living in Toronto, I still feel a deep concern in the matter. There do not appear to be two opinions with regard to the necessity of a trunk sewer in this city, and I should hope that the enlightened voters of Toronto would scarcely require that question to be discussed. As to the outfall of the sewer, however, I am hardly so clear. I think I can

understand the position of the members of the Ontario Board of Health; and I must say that from my own experience in the matter I would hesitate before agreeing to that particular point for an outfall. But it seems very clear, from what his worship the mayor has told us, that the city is not committed to that particular outfall. On the main question, a trunk sewer seems to me to be so very indispensable to the city that it is rather wonderful that there should be at this period, after fifteen or twenty years' discussion, any doubt as to its requirements in that respect. I think myself that the outflow should be very much further from the source of the water-supply than it appears to be in the proposed scheme, as indicated on the map. I certainly should hardly be inclined to support that outflow. But it can easily be understood from what his worship has said that that particular point for an outflow is not an essential feature of the system. I do not see why it should not be understood that if the scheme is proceeded with, that part of it should be modified within the present year, or within four years, so that the sewage could be pumped up on Scarborough Heights, or the pipe extended out into the lake, or any other plan adopted, so far as that part of the scheme is concerned. Meanwhile, however, a trunk sewer seems to be such a necessity for the city that I think it would be a great pity if Toronto were to miss its present opportunity, or if this Association should take any action which would prevent a single voter from supporting the scheme to-morrow. I am certainly strongly in favor of the motion which has been offered to the Association.

Dr. P. H. BRYCE, of Toronto.—I wish for a moment, Mr. President, with your permission, to interrupt the discussion for the purpose of making an announcement. I desire to intimate to the Canadian delegates to the Association, who have, I think, received notice that there will be a meeting of the Canadian delegates for the purpose of forming an Ontario Association of Executive Officers, that that preliminary meeting will be held this afternoon at four o'clock. I would request any of the gentlemen here, who know of other Canadians in the city who are executive officers of boards of health, to inform them of this announcement. The meeting will be held in this room.

Mr. F. N. BOXER, C. E., of Montreal.—As a sanitary engineer, I would not think for a moment of giving an expression of opinion contrary to the advice of the eminent engineer who has been consulted in this matter, which is one of such vast importance to the city of Toronto. There seems to be some doubt on the one side, but apparently all the engineers are of opinion that there should be a trunk sewer, and it is merely a question of carrying the outfall pipe to some particular portion of the lake. That seems to be a matter of doubt on the part of the city engineer and Prof. Galbraith. It appears to me that the only course which the mayor and the city council can pursue is to follow the advice of the gentlemen they have employed.

Mr. EMIL KUICHLING, C. E., of Rochester, N. Y.—There seem to me to be two distinct questions before the Association, in connection with

this matter of the sanitation of Toronto. One question is the expediency of the system of sewerage as proposed by this board of experts, and that is a question which I presume the Association cannot decide. It must be left to the good sense of the experts themselves, as it is too broad to be entertained here. The other question which has been raised is, whether the outfall of this system of trunk sewers will be liable to pollute the water-supply of the city. This is an entirely separate and distinct question, and I think it is upon this question that the Association would be more competent to give an opinion. I presume it is on that question that the opinion of members of this Association is sought. In the proposed scheme, I see from the chart that the distance from the intake crib of the water-works to the outfall of the sewer is three miles and three quarters. We have heard from one of the preceding papers something of the nature and character of the disease germs which may be disseminated and distributed by means of large bodies of water. I was much interested and pleased with that paper; but the sum and substance of it appears to be that little is known on the subject, so far as the question of health is concerned. It does seem plausible to say that even if ninety tons of excrement and other foul matter are distributed at one point nearly four miles distant from the intake of the water-works, with the current naturally in the opposite direction, with the prevalent winds of the lake in the opposite direction, with the enormous volume of water into which the sewage will be drawn, and through which it will be disseminated, with, as the mayor has said, the opinion of the experts that the heavier matters discharged by the sewer will at once be precipitated and the lighter will float to the surface,—I say it does seem plausible to say that, under these circumstances, the pollution will be so infinitesimally slight that very little danger need be apprehended of contamination at the water-works intake. That, however, is a moot question, and it is one upon which authorities and opinions differ widely. We have among the members of this Association experts on this science of bacteriology, who should be competent to give some advice in the premises. It is, therefore, rather a question of the danger of an infection of the water-supply of the city, if this proposed plan is carried out under the conditions as they are represented to us, and which of course we must take for granted, as we have not the means of verifying them by our own personal knowledge or observation.

Dr. E. M. HUNT, of New Jersey.—I move that the following words be added to the resolution:

"That in the judgment of this Association the city council of Toronto has acted most wisely in submitting the question of sewerage to well known and competent engineers, and that we have no reason to doubt that on the technical details their opinion should be accepted."

Dr. JOSEPH HOLT, of New Orleans, La.—It is clear to my mind that this is a question with which we can only deal in the form of generalization. Most of us present are absolute strangers to this city, knowing not even the names of these streets, having no knowledge of the trend of the



water, and therefore we are not competent to entertain an opinion as to any plan that may be submitted. But having come through a long and severe fight, without yet having reached a definite conclusion, in the city of New Orleans, on this same question of a trunk sewer, and having therein a population of 237,000 people to pick up and move in one particular direction in order to do something for the public relief, I can understand the mayor's position exactly. He does not ask this Association to take up the question and determine it in any detail, as to this method or that; but he comes before us and he says, For years I have been hammering and working at this population in order to get rid of a great public nuisance, to bring about an important measure for the health of the people;—and, to give the popular mind an impulse in a direction which will lead to something effectual in the way of relief, he simply asks this Association to give its assistance. Here is the general proposition: That this lake is polluted; that the water-supply does come from a point near the sewerage outfall of this city; that the health of this city, particularly in the summer season, is seriously affected, and most unquestionably from that source. Now he comes forward with another statement,—the statement that the public mind has been brought to confront this issue; that the friends of reform—and there is where we have to deal with the question—have so operated on the public mind as to arouse in that mind a sense of the necessity for reform. Now, what is a public health association is to arouse in the public mind of this entire country that one sense of the necessity of looking to sanitary reform; and just as soon as this Association endorses this action of the mayor, this action of the friends of reform in this city, it will have done something and effected something, I believe, in furtherance of the objects for which it was organized. It does not commit itself to this system or that. It simply lends its assistance towards enabling these local health authorities and municipal authorities to give a first impulse to the public thought, which is bound eventually to put in execution a higher and more perfect condition of public health in Toronto. It seems to me that this Association can, with perfect consistency and propriety, render that assistance. [Applause.]

Dr. GEORGE M. STENBERG.—Unfortunately, I have not heard all the discussion which has taken place on this subject, and I have only a few words to say. I have been told that some of the gentlemen present have been disposed to doubt whether material coming from this source, and diluted as it is, could be injurious to the public health in the way of conveying the disease germs to the supply of water; whether, in fact, they would not be so greatly disseminated, and presented in such small numbers, that they would be innocuous. Now it is pretty generally known to us that sufficient evidence has been collected among scientific men to determine the true bacillus of typhoid fever; and any person who has noticed these germs knows that a single drop of fluid contains millions of them, and that if you had a single case of typhoid fever in the city, act-

ually millions of these minute organisms would be discharged into the water by the sewer. How many of them are required to develop a case of typhoid no one can tell, but it is probable that under such circumstances the number is not of great importance, and that a few germs would do the business. We have no exact knowledge in that particular; but in view of the facts presented, it seems to me that the danger of a contamination of your water-supply is self-evident.

Mr. FRANKLIN GAUNTT, of Burlington, N. J.—I have been very much impressed with the discussion which has taken place, and in the course of which everything has been said which could be said, except one thing which I propose to say. Toronto is doing what every other city has to do, sooner or latter—looking for a good supply of water. The question for its people is, whether they have not been poisoned long enough, whether the city's death-rate is not criminally high, whether it is not indictable by an action at law for the number of deaths which take place annually that might have been prevented. When the question presents itself to the people how long they shall continue to drink sewage,—not that sewage in itself is dangerous, but that the danger lies in its contents,—how long they shall allow the discharges passing from the bowels of typhoid fever patients to pass from one man to another, and so on, producing sick people by the hundred,—I say, when this question presents itself to the minds of the people, they will probably arrive at a wise conclusion. Are the people of Toronto acting wisely when they allow this state of things to continue? How long do they want to eat and drink the contents of other men's bowels over and over again? That is the plain question. Sewage itself is nothing; it is simply a common carrier; but if it conveys into your system something which kills you, it is an entirely different matter. I would advise the mayor of this city to issue a proclamation immediately that nobody should use the water, supplied as it is at present, unless it has been boiled recently, and for a certain length of time, and let him enforce the penalties for non-compliance. Let it be made a misdemeanor, and then the people will soon begin to understand that they are eating and drinking their own excrements day after day.

Dr. JAMES F. HIBBERD, of Richmond, Ind.—This is the position of the Association at present, as I understand it. We are here in Toronto of our own motion, and to some extent as the guests of the people of Toronto. They have a serious proposition before them, and they have told us that the present condition of things is one which is very undesirable and almost intolerable. They have a bay full of the germs of disease—full of the excitors of disease, at any rate—and they want to get rid of them. I understand the mayor to say, and it has been said by other gentlemen here, that they have sent for the best experts they know of; and these gentlemen have come to the city, and, after examination and consideration, they have laid down a system by which to get rid of these things. The acceptance or the rejection of that system is to be voted on to-morrow; and it is certainly entirely within the competency of this

Association, and only a reasonable duty, for it to say that under these circumstances it knows no higher duty than to sanction the propositions which have been submitted, and which have been declared by competent experts to be the best that can be devised to that end. [Applause.]

The PRESIDENT.—I wish to announce that there will be a meeting of the Executive Committee of this Association at the Rossin House, at four o'clock.

Dr. JOHN COVENTRY, of Windsor, Ont.—There are one or two matters which have suggested themselves to my mind during this discussion, upon which I desire to offer a few remarks. One is, that in the consideration of this matter by the engineers, there has perhaps been a little want of data to guide them as to the currents of the lake. Some observations have been taken on that subject, but still there seems some doubt as to whether the currents of the water will carry back the discharges from the sewer to the intake of the water-supply for the city. That is a matter which I fancy would take a series of years to determine; and, as taking that length of time would be an exceedingly injudicious thing to do, I think it would be wrong to throw doubt on the determination of the engineers before giving their advice in this matter. I suppose it has been considered whether, in the event of its being discovered in the future that the sewage was contaminating the water-supply, there would be any engineering difficulties in moving the intake of the city water to a point higher up, or whether that could be done at a smaller outlay than by removing the sewerage output further down. I have heard nothing on that point in the course of the discussion. I have listened with a great deal of attention to the arguments presented in this matter; and knowing from experience the effect that would be produced by infusing doubts into the minds of the people on the eve of a vote upon this subject, I think it would be very wrong for this Association to do anything or say anything at the present time which would mar the chances of such a desirable by-law as the one proposed being brought into force to-morrow.

The PRESIDENT.—I call attention to the fact, which, I confess with a certain amount of shame, had escaped my attention, that the resolutions which have been moved cannot be voted upon at this session of the Association.

Dr. WM. OLDRIGHT, of Toronto.—I wish to make a few remarks, in the first place in answer to some of the observations which have fallen in the course of the discussion, and in the next place for the purpose of defining the position of the Provincial Board of Health in connection with this matter. An act of parliament of our province requires that any scheme of sewerage or water-supply that may be initiated shall be submitted to the Provincial Board of Health; and that is the reason why our board took up the matter. I know that his worship the mayor is sincere and in earnest in what he says; that he knows we are desirous of promoting the sanitary condition of the city; and that we are as strongly in favor of a trunk sewer, and of removing the sewage from our city front, as anywhere else. I may say, in fact, that we are a great deal more anxious on this



matter than many other persons are ; and I might remind his worship that in congratulating him on his election as mayor, I said, in the note which I sent him, " Now I hope this trunk sewer question will be settled : we have hopes that you will settle it." It is not at all likely, under these circumstances, that at this stage of the matter our board would willingly do anything to defeat the carrying out of a scheme of that kind. With regard to our bringing it up at this late period, I may remind him that we only received the report from the city ten days ago, and on writing to the city engineer for extra copies of the report I was able to obtain them only on last Tuesday or Wednesday, so that we had not an opportunity of bringing the matter forward at an earlier date. So anxious were we to avoid any appearance of a difference of opinion on the trunk sewer, and to neutralize any effect in that way that our report might have, that I requested the chairman to write to the mayor, asking him if he could not in some way make it clear and distinct that the question of the outlet was not a necessary part of the scheme, so as to avoid the possibility of defeating the object which we are as anxious as he is himself to accomplish, that is, the building of the trunk sewer. Some remarks have been made indicating that we should not question a matter of this kind which has been decided by engineers. I would remind those gentlemen that we have on our board a very competent and expert engineer, Prof. Galbraith, who was chosen by the government of this province from among all the candidates who presented themselves to lecture on the subject of engineering in our School of Science. I would also say that Prof. Galbraith is a gentleman who has devoted a great deal of attention to sanitary engineering ; and I think the board adopted the only plan it could adopt, when our own engineer, a gentleman of standing in his profession, expressed an opinion with regard to the outfall differing somewhat from the opinion of the other engineers. We could not do otherwise than be guided somewhat by his opinion in the matter. We did not want the question of the outlet to be settled without more expert knowledge. We saw that the float experiments which were instituted did not indicate that there will not be a westward flow ; in fact, that they indicated, so far as they indicated anything, that there will be a westward flow. I would again remind you that the trend of the sand of which the island has been made up has been constantly westward. This is a fact which is well known to all the citizens of Toronto : it is well known that the sand has been washed toward the city, and, at the same time, the detritus of Scarborough Heights has been washed in this direction. With regard to the statement that we should at once accept every statement of an engineer, no matter whether or not he has had time or opportunity for observation, I would point as an instance to our own filtering basin. That basin was built at immense cost, and, after expending a large amount in obtaining the advice of eminent engineers, it was abandoned. So I say that when we have the opinions of eminent engineers on both sides of the question, our proper course is to go on and construct the trunk sewer, and leave the question of the outfall for subsequent consideration. I am glad that

we have had also the opinion of Dr. Sternberg, who is probably one of the most eminent of bacteriologists, in support of our opinion; for besides the engineering question, there is also a medical question involved. This latter question, namely, whether that sewage, laden with germs as it is, will find its way to the water-works crib, is the one upon which I have always insisted most strongly. The mayor has told us Mr. Mc-Alpine's opinion, that the prevailing winds and currents are from the west: but we know, as a matter of fact, that they are often the other way. I am heartily in favor of the building of a trunk sewer, and I am sorry that any gentleman should have supposed for a moment that any member of the board was opposed to it. The real question between us is, Shall we go on building that sewer in such a way that it will convey the sewage to a point where we are not certain that it will not be taken up into the inlet crib? We are not trying to throw obstacles in the way of building the sewer: all we want to do is to carry it a little further away, or to wait until we have made sufficient experiments to show that it will not interfere with the water-supply. I intend, on the assurance of the mayor that the outlet can be changed if necessary, to vote for the by-law, and I heartily support the resolutions moved by Drs. Lee and Hunt.

On motion, the Association adjourned until 8 o'clock P. M.

#### *EVENING SESSION.—8 O'CLOCK.*

At 8 o'clock P. M. the Association was convened at the theatre of the Norman School building.

Dr. C. W. COVERNTON moved that Daniel Wilson, LL. D., president of the University of Toronto, take the chair.

Mr. W. H. HOWLAND, Mayor of Toronto, seconded the motion, which was carried.

Dr. WILSON.—It is with very great pleasure that I perform the duty which has so unexpectedly devolved upon me of expressing, on behalf of the citizens of Toronto, the extreme pleasure with which we welcome here this gathering of sanitarians who constitute the American Public Health Association; especially the pleasure with which we welcome amongst us so many gentlemen of eminence and distinction from other parts of the Province, and still more from other countries, to some of whom we shall have the pleasure of listening this evening. [Applause.] I would call on the Rev. Provost Boddy to open the meeting with prayer.

Prayer having been offered by the Rev. Provost Boddy,—

The CHAIRMAN.—I would now call on Dr. C. W. Covernton, chairman of the Provincial Board of Health, to deliver an address of welcome.

Dr. COVERNTON then delivered an address of welcome. (See page 23.)

The CHAIRMAN.—We looked forward with pleasure to having present with us this evening the Hon. A. M. Ross, commissioner of health. I extremely regret, however, that owing to illness he is unable to be present; and I think that we might perhaps legitimately reflect on this Asso-

ciation, that it could not maintain the Minister in health on an occasion of this kind [laughter]. Happily, however, he will be represented this evening by one of his colleagues, the Hon. A. S. Hardy, whom I will now call upon to address you.

Hon. A. S. HARDY, who was received with applause, addressed the meeting. (See page 28.)

The CHAIRMAN.—I now call upon His Worship Mayor Howland to deliver an address of welcome on behalf of the city of Toronto.

Mr. HOWLAND was received with loud cheers, and then addressed the meeting. (See page 30.)

The CHAIRMAN.—His worship the mayor has welcomed the members of this Association on behalf of the citizens of Toronto. It will now be our privilege to listen to an address by the President of the Association, Dr. Walcott, of Massachusetts; and I am sure I may say most cordially on your behalf, as I say on my own, how great is our pleasure of seeing among us so distinguished a representative of the United States, of New England, and of such a centre of the United States, as well as a representative of that eminent profession of which he is so distinguished a member. [Applause.]

The PRESIDENT then read his annual address, which was received with loud applause. (See page 1.)

The Association then adjourned until Wednesday, October 6th, at 10 o'clock A. M.

## SECOND DAY.

WEDNESDAY, October 6, 1886.

### MORNING SESSION.—10 O'CLOCK.

The hour of 10 o'clock having arrived, the Association was called to order by the President.

The PRESIDENT.—The first thing in order is an announcement from the Local Committee of Arrangements, by Dr. Bryce, chairman.

Dr. BRYCE.—Mr. President and Gentlemen: There are very few announcements to be made to-day in addition to those which were made yesterday. I may state, however, for the information especially of those gentlemen who are accompanied by lady visitors, that at four o'clock to-day a reception will be held in the parlors of the Rossin House by the Ladies' Reception Committee. Gentlemen who have lady visitors with them will kindly apprise these friends of the fact, and ask them to be at the Rossin House parlors at four o'clock. The morning session will be as usual, and the evening session at eight o'clock will, I presume, be as you find it in the printed programme. For the information of all Canadians present, I may state that at four o'clock to-day the organization of Executive Officers of Boards of Health for Ontario, which was established yesterday, and the constitution for which was adopted, will meet for the election of officers and for the transaction of general business. All Cana-



dians, who are delegates from local boards of health, will kindly be present this afternoon, so as to make this meeting as large, important, and interesting as possible. I may say that the Treasurer of the American Public Health Association has his office up the stairway to the right, that blanks to be filled in for application for membership will be found there, and also that certificates for reduced railway fares for return trips will be signed there. Dr. T. S. Covernton, chairman of the Committee on Transportation, will make all these arrangements with regard to the railway trips. There has been some misunderstanding as to who should sign these certificates, but Dr. Covernton will give gentlemen complete and full information on this subject in the Treasurer's office up-stairs. I am further requested to intimate that the adjourned meeting of the Conference of State Boards of Health will be held in the Queen's Hotel parlor at five o'clock this afternoon.

The PRESIDENT.—Next in order are announcements from the Executive Committee.

The SECRETARY.—The Executive Committee recommend the following names for membership. (Names in list.)

On motion, the Secretary cast the ballot of the Association for the names as read, and the persons whose names were read were admitted as members of the Association.

The PRESIDENT.—It is perhaps a proper question to submit to the Association that a great deal of difficulty was found yesterday on the part of various speakers in making themselves heard in this hall. The use of the neighboring hall, which is a smaller room, is offered to us, and if it is desired to move into it, the Association will please express that desire.

On motion, it was decided to adjourn to the adjoining hall.

On reassembling,—

The PRESIDENT.—The Association will come to order. The Secretary has a resolution to read from the Executive Committee.

The Secretary then read the following resolution (resolution respecting Toronto Sewer).

The PRESIDENT.—You have heard the resolution as reported back from the Executive Committee. What action will you take thereon?

On motion, the recommendation of the Executive Committee was adopted by the Association.

Dr. GIHON.—Ought not the word "Toronto" to appear in that resolution, "sanitary necessity for Toronto"?

The PRESIDENT.—That involves a reconsideration of the resolution.

Dr. GIHON.—I move that the resolution be reconsidered.

The motion, having been seconded, was put to the meeting, and carried.

Dr. GIHON.—I move that the words "for Toronto" be inserted in the resolution.

The motion, having been seconded, was put to the meeting, and carried.

The resolution as amended was then adopted.

The PRESIDENT.—The roll of the Advisory Council will now be called. I would request that in the case of those states the members for which may be absent, there will be some indication from the floor of the members actually present from them.

The Secretary called the roll of the Advisory Council.

Dr. Rauch moved that the President be asked to fill the vacancies on the Advisory Council.

The motion, having been seconded, was carried.

Dr. GIHON.—I move that the Advisory Council be called together at four o'clock this afternoon for organization.

Dr. McCORMACK.—I move, in amendment, that the Advisory Council be called together at nine o'clock to-morrow morning. The state boards of health meet at four o'clock this afternoon.

Dr. GIHON.—The meeting this afternoon will be a very short one, for the purpose of electing a chairman, while the other will be a long meeting, for which one hour will not be sufficient.

Dr. REEVES.—There must be a meeting of the Executive Committee immediately preceding the general session, and as members of the Association must be at the Advisory Council meeting, and cannot be at both places at the same time, nine o'clock will be out of the question.

Dr. J. D. PLUNKET.—I would suggest that it be held at three o'clock this afternoon.

Dr. McCORMACK.—I am inclined to accept that.

The PRESIDENT.—The motion now before the Association is, that the meeting of the Advisory Council be called for three o'clock this afternoon.

A DELEGATE.—I think half past three would be more convenient, as then we might have time to get through the morning session of the Association, and have our lunch.

Dr. REEVES.—Why could not the Advisory Council meet in the Rossin House at three o'clock, so that we could have our lunch about the same time? I move, in amendment to the amendment, that we meet in the parlors of the Rossin House.

Dr. PLUNKET.—I accept that.

Dr. GIHON.—I move to amend the amendment by making the hour half-past three o'clock.

Motion as amended was put to the meeting, and carried.

The PRESIDENT.—I hold in my hand the following telegram to the Chairman of the Montreal Public Health Association (telegram from the Montreal Board of Health).

Dr. ROHÉ.—I move that the President of this Association be requested officially to acknowledge the receipt of the telegram from the Montreal Board of Health, and to convey the thanks of this Association for its good wishes.

The motion, having been seconded, was carried.

Dr. VAN BIBBER.—I have here a paper which it is intended to offer,—not to have it discussed or acted upon now, but simply placed in the hands of the Secretary for submission to the Executive Committee. I

would state that it is not entirely my own, but has been worded with the assistance of other physicians.

The PRESIDENT.—Under our by-laws the resolution goes to the Executive Committee without debate. I will now announce the following appointments to the Advisory Council, to replace gentlemen understood to be absent. I shall be glad indeed if states which have hitherto been reported as not represented have a representative present, and I hope that in such cases notice will be given from the floor. The appointments are as follows: California, Dr. Orme; Kentucky, Dr. McCormack; Minnesota, Dr. Hewitt; Missouri, Dr. Nelson; New Hampshire, Dr. Conn; South Carolina, Dr. Bratton; Tennessee, Dr. Plunket; West Virginia, Dr. Reeves; District of Columbia, Dr. Salmon; United States Army, Dr. Sternberg; Dominion of Canada, Mr. Boxer.

The PRESIDENT.—As the Committee on State Boards of Health are not quite ready to submit their report, we will now take up the reading of the paper on "The Relations between Sanitary Science and the Medical Profession," by Nathan Allen, M. D., LL. D., Lowell, Mass. As Dr. Allen is absent, Dr. T. S. Covernton will read the paper. (See page 85.)

Dr. GIBON.—Mr. President, I notice that the Minister of Health, Col. Ross, is in the room, and I move that he be invited to a seat on the platform. Carried.

The PRESIDENT.—The report of the Committee on State Boards of Health, Dr. Hewitt, chairman, is now in order. (See Reports of Committees.)

Dr. HEWITT.—I would say, Mr. President, that the Committee suggest, for the purpose of facilitating the discussion of these resolutions, that their introduction to the Association be conducted as in the Conference of State Boards of Health, by Dr. Holt, who introduced them.

The PRESIDENT.—You have heard the report of your Committee; it is now before you for discussion. Will Dr. Holt open that discussion?

Dr. HEWITT.—I beg your pardon, Mr. President. I should have stated that it was intended that Dr. Bryce should open the discussion by reading a paper on this subject, and that Dr. Holt should follow him.

The PRESIDENT.—There being no objection, the amended order will be followed.

Dr. BRYCE.—As those present at the Conference of State Boards of Health on Monday will remember, I there introduced this subject as chairman of the committee appointed last year to report on the subject of inter-state notification of infectious diseases. I there stated that no progress had been made during the year in the coöperation on a systematic basis in this notification, which was proposed last year, and which, as a committee, we were expected to promote. I further stated in that paper that during the past year the necessity in this northern country for such inter-state notification was very much less indeed than it was in the disastrous year 1885. I also said in that paper that it is best in times of peace for us to prepare for war, and for that reason I introduced a paper with the three or four crude propositions which afterwards concluded it.



Those propositions have been amplified or extended by the report which Dr. Hewitt has presented; and I would much prefer that the discussion should take place, not on those crude propositions of mine, but on the more extended and matured regulations which have come from the National Conference of State Boards. I stated, however, on that first evening, that we had had during the past year one of the most significant examples of the necessity for this coöperation, in the case of some Russian immigrants who came to Canada *via* the St. Lawrence. I need not repeat in detail what I then stated,—that from these three or four immigrants, some of whose compatriots were left at Grosse Isle on the St. Lawrence sick with the small-pox, six or eight distinct outbreaks occurred, either in Ontario, Michigan, or in the state of Illinois, and one in Dakota. This was a case which was given; and it only illustrated the fact that five or six or seven outbreaks might occur, and be made separate centres for the dissemination of the disease, all from one set of immigrants, some of whom came through infected; and that it was absolutely necessary for us, in order to promote our other interstate and continental work, to receive instructions inland of the class of passengers coming over in ships in which there has been infectious disease of one kind or other. The case was and is so plain to everybody who has practical work to do in this direction, that argument on the point is hardly necessary. Dr. Holt will tell you what has been done on the Mississippi in this direction in the case of yellow fever. I would only say here, that this province and the provinces to the east, and the quarantine officers of the St. Lawrence, have steadily pushed in Canada for an improvement in our quarantine regulations, up to the point of the government having given us a set of regulations, passed this year, so thorough as to make the introduction of such diseases into the United States, or into the western provinces, almost an impossibility, if, as the President said last night, thoroughness characterized their execution. Now we wish something in this connection to be done at similar ports to those of the St. Lawrence, on the Atlantic seaboard and at the American ports. As you will remember, I referred—and this is the only point I did not take notice of—to a letter received from the Department of Agriculture at Ottawa, stating that they are informed that the ship companies of the ports of New York and Boston, and I presume of other and similar Atlantic ports of the United States, are permitted to come in past the quarantine officers without any examination of cabin passengers; and the Department further asks that we should bring the matter before the Conference of State Boards and before this Association for discussion. It is quite apparent that Canada will not thoroughly carry out any scheme of thorough examination and vaccination, to the detriment of her own trade and commerce, if the ports of Boston and New York, and other United States ports, are allowed, through any sentimental or commercial considerations, to permit cabin passengers to come in without some kind of an examination, and some attention to vaccination being required. [Applause.] The Association can see that it is not fair; and we shall not insist upon this

particular quarantine regulation being carried out in Canada until we have an assurance that similar regulations will be enforced in the United States,—until, in fact, we are protected from the spread of infection by immigrants coming through to all parts of our country by Boston and New York in the same way that the United States is protected by the enforcement of these regulations on the St. Lawrence. [Applause.] Without saying anything further, I would recommend *in toto* the regulations which have been brought up by Dr. Hewitt for the serious consideration of this Association, and I would further ask for an expression of opinion on this last point to which I have referred. The report, so far as I am concerned, is open for the discussion of the meeting.

Dr. HOLT.—I profoundly regret that, owing to circumstances over which I have had no control, my time has been occupied in the direction of Association work to such an extent as to have rendered it absolutely impossible for me to give that quiet time to the formulation of the several important points involved in the question that is before you,—that attention and that careful arrangement which I deem the subject so richly to demand; and I beg the forbearance of the Association with me in having the temerity to stand before you and attempt in an off-hand way to present a subject of such vast weight, as affecting not only each individual community, and as affecting each individual state, but as affecting this entire combination of states, and our neighbor the Dominion of Canada. The question of the interstate notification of disease, as a practical experience, seems to be one which disposes of itself without further consideration. The small-pox breaks out: under a system of interstate notification you tell your neighbor, and that settles the question. Yellow fever breaks out: interstate notification—and that settles the question. But in practice, when you have left the hall of this Association, when you find yourself standing alone on the shores of the Gulf of Mexico, standing alone, as the representative of this body, as a sanitarian, on any of the great lakes of the north, or in any one of our cities, or on the Atlantic seaboard, and you are brought to confront this question of the announcing of a pestilential disease by the notification of your neighbors, it becomes a vastly more difficult problem. In the face of the enormous commotion which an announcement of that kind necessarily carries with it, you find that at once you are brought face to face with by far the most momentous and most trying question which could possibly present itself to you in any respect, as applied to your functions as health officers and sanitarians. This question, so far from being one which can be disposed of in a few words, involves, first, the local outbreak of the pestilence; it involves all that may be said in relation to that first case or suspected case, and all that is locally involved in the disturbance of the entire social and industrial equilibrium; it involves the extension of the alarm, the commercial disturbance, and the social disturbance from your own community to neighboring communities and neighboring states; it involves the full play of human passion, and the exhibition at the same moment of the passion of terror in its most abject form, of avarice in the most hideous

aspect in which it can be presented in the human form, short of the cannibals of the islands of the South Sea. You have there exhibited the demoniacal nature of man, who, while it is not the fashion to lay his hands on and eat his fellow-man, yet will go just as far towards devouring him, as utterly regardless of what we call humanity as the law and the times will possibly allow him to be. And when I say that you will confront this thing there, and have it confronting you,—not in any timid way, but ready to take you by the throat and throttle you,—I mean that you will have there the keepers of saloons, the keepers of bar-rooms, the keepers of hotels and sea-shore hostelries—those men who are in your banking-houses, the heads of your railroad department, men who exhibit that spirit that rather than have their personal affairs or their commercial affairs interfered with by you, or by any disturbance of which you have been apparently the head and front, they would crush you. In other words, they would not stand back a moment to prevent the pestilence from coming in right between their fingers, and ravaging the country at the expense of tens of thousands of lives, if by standing back they could only save themselves the units of dollars. [Applause.] And it is this fact which, among other things, makes this question of the announcement of a pestilence by far the most momentous which could engage the attention of sanitarians, of health officers, or of humanitarians. In the next place, and finally, it involves the rational remedies which are to be applied—those rational remedies which are to be applied on the instant to the infection, or to that which appears to be the infection; to the state of panic; to the opening up to the public eye of that which has heretofore heightened the danger; to the quieting of terror; to the letting the people both in your own community and in other communities know the real extent of the danger; to the allaying of their alarm, because you cannot prevent alarm when there is danger—all you can do is to make the alarm commensurate with the danger, in other words, by letting them know the full extent of the danger. A man, a woman, or a child is not to be frightened beyond the actual amount of the danger, provided they have any just conception of the actual danger. It is the hidden terror that paralyzes: it is that which will make the soldier quail who would stand before a battery of artillery if he could but see it. It is of that which he does not see that he is afraid, infinitely more than of the actual danger which confronts him: and it is with the comprehension of that important psychological fact that you have to deal with in this question of interstate notification. It involves the forewarning and the forearming, not only of your household, not only of your immediate neighbor, but of outside communities, and of neighboring and distant states. It involves the question of the right, the inherent and inalienable right resident in any community, resident in every community and every state, the right of self-protection, the right to demand the exercise of the right of self-protection. In conclusion, we see that, looked at in this manner, as to the practical outcome of all which pertains to the term “interstate notification,” it becomes necessary that state health authorities should recognize the momentous question in



all its bearings, that we should meet together, that we should formulate a plan, that we should mutually agree to a course of conduct in our relations as state authorities to this great question. We will find that there is one central thread around which all that may be said on this question is in practice crystallized, and it is that one word, confidence. When one state has unquestioning confidence, regardless of consequences, in the health officers of another state, whether the outbreak be one of cholera, or yellow fever, or small-pox,—when their confidence is so absolute as to make every movement one of decision, one of quiet and determined action, and to make them co-laborers in the work not only of suppressing and hedging in the disease, but of allaying panic, and of preventing the commercial injury which otherwise must inevitably ensue from any lack or loss of confidence,—the work before you is pretty well accomplished. While the cities bordering on the great lakes, the cities in the provinces of Canada and those on the northern seaboard of the Atlantic, have enjoyed a blessed immunity from having forced upon them the momentous issues involved in the term I have just mentioned, the Gulf States, those states immediately interior to the Gulf States have not been so fortunate. On account of the regularly recurring alarm, as each summer rolls round, of the fear of yellow fever, of the rumor of its outbreak, we have been able in those states to come together in a close alliance, in an organization termed the Conference of the Boards of Health of the Gulf States and Tennessee. For many years and through successive organizations of the Louisiana State Board of Health there had been an absolute lack of any feature of that moral principle, of that term confidence; and as a consequence that entire people had been given over to be ravaged, not only at times by pestilence, but in the intervals by rumor. Social relations have been disturbed, commerce has been thrown out of gear, quarrelling, crimination, recrimination, and all manner of hatefulness have become the rule, with a total lack, on the one hand, of any recognition of the right of another state to defend and protect itself; and with an angry assertion of the right, on the part of the other state, to protect itself at any and all hazards. The declaration that “The rumor was false: there is no yellow fever,” and the other declaration that “You falsified before, and we do not believe you now;” the question, “What are you going to do about it?” the declaration, “We are going to quarantine you, your goods, your people, your steamboats, your railways; we will not allow you to come in at all;”—that has been occurring annually, and is likely to occur annually. A more hateful condition of affairs I can hardly imagine. It makes business men especially feel like saying, “We will wind up our business, and go somewhere else, where the people are not always quarrelling.” Not only are there involved the police departments of the different states, as represented in the health authorities, but it brings in whole states and the governors of states; it means the cold attitude and the feeling of real hostility derived from each taking up the quarrels of their officials under them. Now, under that pressure of necessity, and because we had reached a point where we could not help

ourselves, we called a Conference of the Boards of Health of the States of the Gulf and of Tennessee. How did we call it? I can assure you that we did not call it by sitting down and writing invitations to Dr. So-and-So to attend such a meeting. We notified the governor of our state, and he requested the governors of the neighboring states, to appoint commissioners to go there. It was strictly a governmental piece of business, and when those gentlemen appeared there, there were not many of them. There were not over six states represented, and therefore six voices—six representatives; but a more important conference has never been known in the South-west, or recognized by its people. Those gentlemen came there, and when they met, one of the first announcements that was made was this: "Gentlemen, bear in mind that you are no longer doctors; bear in mind that you no longer have any personality, but that you are ambassadors; and we recognize in your presence here two millions of people, and one million of people. We recognize the state of Texas, and the state of Mississippi, and the state of Louisiana, and the state of Tennessee, and the state of Alabama, and the state of Florida; therefore measure your words, measure your actions, as ambassadors;"—and the whole conference was conducted just in that manner. The resolutions were adopted after thorough discussion, after a complete weighing of all the points; resolutions were adopted in spirit and in words almost identical with the resolutions which have been read before you to-day; and these six states I have named, the great stones of which the arch is built, as we spoke of them and regarded them at the time, entered into a mutual agreement, and bound themselves under a pledge, that they would, utterly regardless of and without questioning any disturbance or other consequences which might ensue, give telegraphic notification to each other of any and every case of small-pox, cholera, or yellow fever which might occur. And in order to close every possible loophole which might become a door of escape to the weak and the timid, under the tremendous pressure of public sentiment, so that they might say, "Well, I do not know that the case is one of small-pox or of yellow fever; come to think of it, it does look like chicken-pox, and it is chicken-pox," or, "I cannot say that I know the case is one of yellow fever, and I am bound to report actual cases of yellow fever: that man, it is true, did have the black vomit, but others have had the black vomit, and I really do not know that it is yellow fever,"—in order to prevent that, we said we will just seal up that little hole of escape, which I can tell you under such circumstances becomes as big as a barn door, and we put in the resolution that you shall report every case which reasonably and seriously seems suspicious of any one of these diseases. [Applause.] More than that: we mutually agreed that you "shall" do it, and that under the very first evidence of any failure to do it, and the report coming to us on the wings of rumor, and you fail to recognize your duty in the matter, we agree,—we are all friends,—but just the same we are going to lock you up with quarantine: every avenue outside of your state, leading from or towards your state, shall be locked up, and it shall

stay locked. That is the position we took. [Applause.] And recognizing the true spirit that I know to be resident in the people of Louisiana, I thank God that they have reached that climax where they believe the truth should be recognized and proclaimed in the face of any and of all consequences. [Applause.] And in the Providence of God Louisiana was made the first to drink of that cup; for after scarcely more than three weeks had elapsed I was notified, as president of the Board of Health of the State of Louisiana, that on such and such a street there was a child who was mortally ill with what the physician believed to be yellow fever. Yellow fever in an interior town? Where did it come from? What business had the child to have yellow fever there? How could it get it? The case therefore was not necessarily an actual case of yellow fever, and here was the test. I went and examined the case. And I may say, as some people have stated that I know nothing about yellow fever, that I started in on the yellow fever question by taking it myself when I was eighteen months old, and as a boy I went through the epidemic of 1853 as a nurse, the epidemic of 1854, the epidemic of 1855, and was a resident nurse in the Charity hospital during the terrible epidemic of 1858, and subsequently on every appearance of the disease in the ordinary sense. I mention this because I am delighted to know that there is no man who reaches such a point of experience that he has passed the stage of fallibility; and to show how fallible I am, and how little I know about it, I see by a late number of the New Orleans *Medical and Surgical Journal* that one of my professional brethren says I do not know anything about yellow fever, that I had never seen it, that I don't know the disease, and that I called a light case of malarial fever, without anything infectious or contagious or even malignant about it, a case of yellow fever. The writer says I know nothing about it, although this malarial fever killed two or three people in the course of a few days: but that was nothing, because they had to die anyhow. [Laughter.] At any rate, before I had the conceit taken out of me, when I was called on to visit this child, I thought I did know something of yellow fever. I found it to be a case of fifty hours' duration, with an excessively high temperature, going the whole round of the disease, terminating in convulsions, and a profuse black vomit and death. Well, I called that case suspicious. [Laughter.] So suspicious did I call it, that next morning we summoned a meeting of the state board of health, and we brought this question before them. The great exposition building, towards which the United States government had given \$2,000,000, was then in process of erection at New Orleans, and the announcement of a case of yellow fever, or anything suspicious of yellow fever, was sure to be looked upon as the death-blow to that great enterprise, in which all were more or less concerned, not only for the country in general, but for the city locally. Then, again, there was the tremendous disturbance which would occur. Unfortunately, for a period of many years there had been growing and educating in that city a condition of public sentiment in which a physician dare not say that a case was one which he believed to be a case of



yellow fever. This condition of public sentiment was a most pernicious one; and from circumstances which it is not necessary to mention, this disposition on the part of the mercantile community is not peculiar to New Orleans. It would apply to any city just the same; to Toronto, if the same circumstances occurred. Touch Toronto on the question of closing her railroads and stopping her steamboats and paralyzing her trade and industry generally, and she will kick every time. So that when I say New Orleans, I want you to apply it to yourselves. Under this pernicious mercantile influence they had reached the point of bulldozing the doctors, until a doctor was almost afraid to say that his soul was his own. A doctor would turn white, and with good reason, if he thought a case was one which seriously seemed to be yellow fever. The Louisiana State Board of Health was called together, the case was laid before them, and right alongside of the case was presented the pledge of that board of health at this Conference of State Boards of Health. Right round that table were the representatives of the railroads, the representatives of that great exposition, and the representatives of the commercial interests, protesting all of them against any further mention being made of that thing, and saying for God's sake to stop it right then and there. The board of health said,—“Gentlemen, we recognize your protest, we recognize your fears, we recognize the grounds of your fears, but we recognize that our pledge is far above all these things, and we intend to stand by that pledge.” [Applause.] Out of that office went the warning by telegraph to those who had joined us in the compact, “We have a case which we consider seriously suspicious of yellow fever, and you be on your guard.” [Applause.] In 1885 another case occurred, and it was one that was really and justly suspicious, for it was not one that any physician could really say was a case of yellow fever. The person suspected was a child. Here was a combination of circumstances and symptoms which tipped the balance, and instantly the same thing was repeated there by putting our own community on guard. There was no room for rumor, because they knew there was but one case, and with enforced isolation and complete disinfection the disease stopped right there. As to whether it would have gone any further I do not know; I simply know that it did not go any further. A few weeks later the same experience was repeated in the person of an adult: the same treatment, except that it was a little more positive, for we said, Here is an actual case of yellow fever. What is the consequence? It is that the public press, the railroads, the banking interests, all the interests of New Orleans, the governor of the state, and the state legislature were so completely convinced of the advisability and the expediency of the preservative power of coming out with a full expression of the truth, as we have, that they endorsed it as the fixed policy of the state. I do not say this boastingly, but as an outcome of the educational process,—that I do not believe that there exists upon this continent a city or a people who are so keenly alive to the necessity of immediately reporting these cases, exactly upon the square, according to what has been represented and set forth in those

resolutions, as the people of New Orleans are to-day. Why, let a doctor down there have a case of yellow fever, or one which is reasonably suspicious of yellow fever, let him just dare not to report that case, and the people would almost lay violent hands upon him. They have changed completely around from the position they occupied three years ago. Now, gentlemen, these beneficent consequences have been the outcome of a determinate right action on the part of the health authorities, backed not only by the moral power, but by the physical powers, of their neighbors and those with whom they have interior relations; and is it not well that that which has been so beneficent to the Gulf States and Tennessee should be extended and made national? [Applause.] Let any gentleman in this room, from any one of the provinces of Canada or from any one of the states of the United States, tell me that he may not become a centre upon which converges all of this tremendous pressure, and be made to feel the weight of all that we have had to endure and fight against in New Orleans: he cannot do it. The existence of cholera or small-pox may affect the authorities of Montreal, or Toronto, or Chicago, or New York, or Boston, so as to put you exactly in that position where you are bound to confront the great commercial and social disturbance right before your own homes, where your duty towards your neighbor demands that, regardless of consequences or of any pressure brought to bear on you, you shall immediately notify your neighbor, and let the people of your community and adjoining communities, and states or provinces, know the whole truth.

Dr. HARDING, of St. John, N. B.—Would Dr. Holt state the consequences of the epidemic of yellow fever in the death-rate and the money lost to the country?

The PRESIDENT.—The time assigned for this discussion has expired.

On motion, the time was extended.

Dr. HOLT.—I must instance what our board of health considers a distinct violation of this pledge, and considers, on its own part and the part of those who are bound under the pledge, an injury which gives us the right to complain. I may mention that the two sea-shore counties of Mississippi, by some kink or other in the state law, are independent of the state board of health, and therefore became a little state within a state, with regard to this police power over quarantine, etc. But they entered as representatives of their counties into this same compact, and bound themselves in the same way.

A DELEGATE.—The same as a state?

Dr. HOLT.—Yes; each of these counties besides. About the 30th of August last there came directly to myself as president of the board of health the intelligence that a great panic had broken out at Biloxi, and that the people were fleeing from the place in both directions,—towards New Orleans and towards Mobile. A panic of what? A panic of yellow fever. This intelligence came late in the evening, or considerably after night-fall, and the gentlemen who came to me—there were two of them—expressed the greatest apprehension as to the result, because, as

they said, the panic was extending along the sea-shore. Biloxi, I may mention, is in the state of Mississippi, eighty miles from New Orleans on the Mississippi side. Early next morning I went down town and telegraphed to the authorities of that particular county, a party to the compact, and Dr. Salmon telegraphed to a physician in Biloxi, requesting information. The morning trains came in packed with people; the people were standing in the aisles, and there was evidence of the greatest kind of a panic. The day wore on, and our office was besieged by citizens inquiring what was the news from Biloxi. We could hear the general rumor spreading on the street: we could see that the people were on the verge of excitement involving the entire state. Presently telegrams came in from abroad saying, "We hear that yellow fever has broken out in Biloxi: what does it mean?" We waited until 3 o'clock in the afternoon, but failed to get any response. Then Dr. Salmon and I went to Biloxi on the first outgoing train. When we arrived there we found not the slightest disposition on the part of any of the local authorities or any of the doctors to raise a finger to stay the panic, or to apply a remedy in staying the disease, whatever it was. But we did find men who were absolutely under the thumb of the saloon keepers, the sea-side resort keepers, the oyster saloon keepers, and all of that class of citizens whose interest it was that the people should not leave, but should stay and spend their money there: we found that these men were so profoundly under their influence that they dare not say that they believed or feared that there was a case of yellow fever. One of them quietly told us so, and said, "If we were to tell you that there was a case of yellow fever in this town, we could not live here."

A DELEGATE.—What is its population?

Dr. HOLT.—It has perhaps 300 or 400 of a fixed population, but there were 2,000 or 3,000 people there in the summer. We were met by denial, by suppression of the facts, and by all that you can possibly imagine as the outcome of that grovelling and bending of the professional mind to mere pecuniary interest. I may say that we met there one of the very lowest forms of the professional mind;—this man had been a druggist, and I do not know whether he had a diploma or not, though he called himself doctor. The question was addressed directly to Dr. Salmon, "You are in the state of Mississippi?" "Yes, I know." "Well, by what authority and right do you come from the state of Louisiana into Mississippi to investigate this thing?" His reply was, "By the right of 237,000 people to protect themselves. [Applause.] But," he said, "Don't you mistake us? We are not going to injure you: we come here simply to investigate, to see what we can do to stop these rumors if we can; to find out all the grounds of the rumors;—we have brought our men with disinfectants in case they should be needed;—but if you object we will take the first train back; we will not stay here at all; we will not intrude. But when we go back we will lock you up with quarantine, and not let you out until Jack Frost opens the door. That is what we will do. Now, you dare to prevent us from investigating and finding



out the whole truth, and exercising our prerogative of self-protection." [Applause.] The doors were thrown wide open. They said, "Come and help us to investigate: why, we are glad you came." We did investigate. We investigated some little wine spots, as they called them, like those that might be made by a person who had drunk wine and thrown it up. The average spots were about as big as that book. A woman, they told us, had vomited them after all the fever had left her for thirty-six hours, and then she had convulsions; and though it was only a little malarial fever, still, most imprudently she had gone on and had convulsions, and she died;—but, as they told us, these women had to die anyway. Well, it did not take Dr. Salmon and myself and a doctor from Mobile very long to send a telegram announcing that we had found so many cases, and all the evidence confirmatory of yellow fever. We saw to it that that was telegraphed all over the country; and the consequence was that immediately that locality was corralled. Immediately the bi-chloride of mercury, and a very strong solution at that, was applied to every rag of clothing; old clothing had to be taken off, and fresh clothing put on; we bichlorided everything; we saturated every article of cloth or woven fabrics with it, and they were not washed either, for it was left there. There were eighty people corralled in that locality, and up to the time we got there eleven people had fallen ill, including one the morning we were there. Within the next forty hours seven more fell ill with identically the same fever, and those were evidently cases which had the disease already in them, and after that not a single case occurred, notwithstanding that all these people were there among them. It seemed to be literally quenched, although at first it was going on like wildfire and redoubling every day. Now we did not care whether that was yellow fever or not; we know that it did not square with any malarial fever that any doctor ever saw; we knew it was not small-pox; we did not find the slightest symptom of Asiatic cholera; we knew it was not measles or scarlet fever; and by exclusion we bring it down to a whole combination of symptoms, covering eighteen cases, which were identical with the symptoms that we have seen over and over again in epidemics of yellow fever. That was all we wanted to know. We did not want confirmatory cases; we wanted to stop it right there; and the action which was taken in promptly isolating, disinfecting, and producing an immediate stoppage of the disease, gave the platform to those who had since come in and said it was not yellow fever, and that you cannot prove it was yellow fever. Our success was their salvation, and if we had failed their mouths would have been closed. Our success, while it has put us in the background, foisted them into a possible position of denial which they were not slow to occupy. But we are not done with them yet; we will not permit a board which was a party to this compact to treat us in this way. The Board of Health of Harrison County, Mississippi, met on September 8, 1886, and passed the following resolution:

WHEREAS, at its last session, Saturday, September 4, 1886, the Board of Health of Harrison County, Miss., not yielding its own opinion in the matter, but in deference to the excited condition of the minds of the citizens of Mississippi City and vicinity, reluctantly declared quarantine against Biloxi, not as a quarantine against yellow fever, but as a quarantine against the stoppage of trains at Mississippi City and other stations; and

WHEREAS, in view of the fact that the local physicians of Biloxi have maintained from the beginning the non-existence of that disease in their town,

(And I may state just here that one of the fellows who supported that view was, I believe, at one time a blacksmith, and is now a druggist. I don't know whether he has a diploma or not, but he does not sign M. D. Then it goes on:)

and have been backed by the opinions of Drs. Formento and Murray, yellow fever experts, and later by that of Dr. Godfrey, of the United States Marine Hospital Service; and

WHEREAS, incalculable and irreparable damage has been done, not only to Biloxi but to our whole seacoast by the wavering, uncertain opinions of visiting physicians,—

(That means myself and Dr. Salomon.)

*Therefore be it Resolved*, That with regret we view the course that public excitement has forced us to take against Biloxi, and deplore the "conscientious pledge" of Dr. Holt

(This, I may say, is given in such a manner as to make it sarcastic!)

to report all cases of "suspicious" fever to the world, a "pledge" that will quarantine us every summer, for "suspicious" fever can be found anywhere without much effort.

Now, gentlemen, Louisiana is not at all in any doubt as to where she is going to stand in this case. It brings up an instance of the necessity, in the first place, of entering into a compact of this kind, and of having a general understanding and backing in carrying it out, but it shows also what consequences are bound to ensue from the failure of it, because the great highway from all that coast is into New Orleans from one direction and Mobile from the other. The Louisiana State Board of Health is going to stand squarely on that word "suspicious." And the next time we get a rumor of the existence of any pestilential disease along that coast, I tell you we are going to quarantine first, and let them investigate afterwards. [Applause.] We utterly deny their right to take this ground; we have no pledge or compact with them from this day on, and we will not move from this position until the representatives from our own conference, experts in New Orleans, shall be allowed to go there, and until we have had their opinion. We are going to demand that we shall have representatives there when it comes to declaring or diagnosing any pestilential disease along that sea-coast. This circular was immediately issued to Dr. Wirt Johnson, the permanent chairman of the Conference of Boards of Health of the Gulf States and Tennessee:

Confronted by these statements as set in direct antithesis to all the facts in the recent Biloxi occurrence as revealed to ourselves, the Louisiana State Board of Health is compelled to make complaint of having been, in this matter, unfairly dealt with. Punc-

tilious on its own part of the letter and spirit of the compact to the extremest exaction of interpretation, not hesitating to brave public clamor and to confront the resentment incident to the disturbance of the public quietude and vast commercial movements involved, in the face of every opposition and daring every peril, the Louisiana State Board of Health, in conformity to a mutual obligation, entered into between states, has fulfilled to the uttermost not only the letter but the spirit of the pledge.

We have not hesitated to declare even one case seriously suspicious of pestilential disease, knowing that the only hope of eradication is in the earliest recognition of such dangers, and the only means the instant isolation and disinfection of that which even seems to be the spark of pestilence.

Knowing full well that subterfuge would at all times seek an opening for escape, and that under the repressive dominance of private and selfish interest there is no such thing as a case of actual yellow fever acknowledged and permitted to be reported as such until it may be proven by the unanswerable confirmation of its epidemic spread, this board has fulfilled every obligation by timely announcing and enforcing precaution in cases dangerously suspicious of that disease.

When the term suspicious, condemned under the ban of designing ridicule, shall have been suppressed, the bond of agreement between these states, created for mutual protection, will then not be worth the paper upon which it is written, and terrifying rumors manipulated by the malicious and by speculators will rule the public mind. Upon this word "suspicious" rests the integrity and value of the compact. It is the essential spirit of confidence.

While exacting of ourselves, it is necessary for the sake of fairness, for the maintenance of confidence and the preservation of the public welfare, that we shall not submit to that which we deem and hereby declare a violation of every principle of an agreement binding together under a pledge the states of the gulf and Tennessee, and the health authorities of the seashore counties of Mississippi, a separate organization but party to the compact.

Following our inclinations, we would remain quiet, and under all conditions shall avoid the appearance of strife and unseemly controversy; but it is behooveful to the maintenance of friendly relations and to the future prosperity of these states, in the continuance of a right understanding between their communities in a matter of so great importance, involving directly questions of the preservation of life and the least interruption of industry and commerce, that we shall not permit this action of the local health authorities in Mississippi to pass unchallenged.

The harmonious relations and public welfare, not only of Louisiana but of every state vitally concerned in the management of pestilence, threatened or actual, and above all of those states party to this pledge, demand a friendly but thorough investigation of the recent Biloxi matter, and an early adjudication of the serious difference which now exists. Rebuking the spirit of retaliation, of crimination and recrimination, we, the health authorities concerned, owe it to ourselves, and, above all, to the people of our state, that we shall perfect an agreement, in accomplishing which there is no need for controversy or show of personal animus of any kind.

We would, therefore, earnestly recommend that at such time as would be most convenient to its members a convention of the Sanitary Conference of the Gulf States and Tennessee be called for the purpose of a readjustment.

I will now close my remarks, which I am afraid have been too long; but it is because we have had a practical test of this thing, and we feel the importance of it, that we have brought it before you in order that it may be looked at nationally. [Applause.]

The PRESIDENT.—In the exercise of the discretion conferred on the chair the subsequent discussion will be limited to five minutes for each speaker.

Dr. RAUCH.—I am much pleased with the action of the Conference of State Boards of Health with regard to this question of interstate notifi-



cation. This was one of the most important points embraced in the action of the sanitary council in 1879. The proposition now is to extend this matter of notification not alone through the United States but also in Canada, and so far as I am individually concerned, and so far as my own state is concerned, we heartily endorse that proposition. When the sanitary council entered into this compact in the state of Louisiana, that state was the first to fully carry out this principle of interstate notification. That is a matter of history. I will not occupy your time further on this question; but there is another question in connection with the maritime quarantine of these provinces. At the last meeting of the Association I presented a report on maritime quarantine from the mouth of the Rio Grande to the mouth of the St. Lawrence. I then stated that I was assured that the Canadian authorities would fail to carry out what was then thought to be necessary. In April or May a case of small-pox was found in the state of Illinois that had passed the St. Lawrence quarantine. Attention was called to it, and since then the Canadian authorities have given the necessary instructions not alone to make the quarantine of the St. Lawrence better and more complete than that of any port of the United States, but, as I have learned since, the Canadian authorities are willing to make the necessary examination of cabin passengers. The cabin passengers to some of the ports were not, I believe, examined at all; in fact, I find that that is the condition which generally obtains. Now the question to which I wish to refer is that of uniformity, and it is a very important question, one of as much importance as the question of interstate notification. I recollect when there were a number of cases of small-pox brought into the country, some going into Michigan, some into the province of Ontario, and one or two into Dakota, and when the authorities were called on to enforce quarantine against Canada on account of this introduction of the small-pox, we in Illinois had three importations from New York; we were all calling upon some authority to quarantine New York;—so I say that it is of the utmost importance that the same rule should obtain everywhere if we wish to protect every part of this country.

Dr. O. W. WIGHT, of Detroit, Michigan.—If I have any objection to the resolutions which have been proposed here, it is that they do not go far enough. I would not only agitate the giving of information from state board of health to state board of health, and from municipal board of health to municipal board of health, throughout the country, as these resolutions demand, but I would also make it incumbent on every health officer or health board in the United States to give to the press, in its own locality, exact information and the exact status of any outbreak of epidemic disease. If there are any cases of small-pox in your town, give the information to the press; and so with cases of diphtheria, scarlet fever, cholera, or any disease of that kind. I have found in my experience of eight or nine years, in municipal health administration, that the press is always ready to give exact information, if it can give it; and if it cannot get exact information, it will get rumors. I remember a year

and a half ago receiving a communication from a brother health officer in the city of Syracuse that two or three cases of small-pox had appeared there which had been introduced by a certain sleeping-car, the Malmo. I took his information, I relied upon it, I gave it to the press; it was in the evening papers of my own city within two hours after I received it, the associated press agent telegraphed it far and wide, and the next morning it was all over the United States, giving the name of the sleeping-car, the Malmo. That car was then in service; it was on the way from Chicago to St. Louis when it was overtaken by the Chicago papers; the passengers saw that they were in an infected car, and they compelled the company to switch it off on a side track on the prairies of Illinois. The next morning after giving the information the agent of the Pullman Car Company came into my office in a terribly belligerent state of mind. He wanted to lick somebody. [Laughter.] I told him I was the ancient game chicken he was hunting after, if he wanted to lick anybody. [Laughter.] Then he wanted to sue somebody. I told him I had been out of the practice of law for some time, but if he was determined to wade in I would endeavor to brush up again, and at any rate I would not run. [Laughter.] He left me that time; but two days afterwards, when this information had taken effect and this car had been switched off on a prairie, he came in in a different mood altogether. He apologized for what he had said before, and asked me what could be done to stop this excitement and to get that car into service again. I told him that the only thing I would advise under the circumstances would be to burn about ten pounds of brimstone in that car, and, after having it thoroughly disinfected by somebody who understood the work, that he should go round among the local communities where they helped to spread the disease, and contribute some of his wealth towards making amends for the gross avarice and indifference of his company to the public health. I thought that was the best thing he could do; and he went out rubbing his head. [Laughter.] I believe that the outbreak of small-pox in Montreal started in that way, with the terrible effects that we all know of. I have some points in connection with the secret history of that matter, but I will not trouble the Association with them now. I agree with what Dr. Holt has said about coercing commerce, and the avarice which would keep the doors of commerce open with the carcasses of the slain; and I may say that I believe thoroughly in exposing these diseases whenever and wherever they come up. There is no class of men on whom we can rely to expose them but the faithful health officers of this country. You expose everything just as it is, and then commerce, to save itself, will turn to and help you with all its power. [Applause.] It will fight you just as long as you show the white flag, just as long as you are a coward. But you must return blow for blow. You have public sentiment with you, and soon you will find that if you do not quail commerce will turn round and help you control and put down the epidemic. One point more in connection with the resolutions. I was sorry to hear friend Bryce say one thing, and that was that they would not do this one good

thing in Canada if we did not do it in the states. In Canada they should do it whether we do it or not. If we act cursedly, there is no reason why Canada should not continue to shame us by acting blessedly. In connection with this question of looking after cabin passengers, why should the man or the woman in the cabin be exempt any more than the man or the woman in the steerage? It is not human, it is not natural, it is not just or godly. It is going down on all fours to the spirit of commerce which we were denouncing. This case of small-pox of which I have been speaking, which came from that sleeping-car, originated with some cabin passengers arriving at New York, and it is oftener through that class that disease is spread through the country than through the poor; it oftener comes through those who have the means and can take care of themselves. I know that men have been exempted from having their houses placarded for contagious diseases because they were wealthy and lived in big houses. I would like, in such cases as that, to wield the hammer and drive the nails and put the placard right on the house myself. If ever I go in person to put up a placard and not send a policeman, it is to such houses. Exempt no man. God Almighty exempts no man from contagion or pestilence because he has more dollars than his fellow-man, and let us act justly and equally with all the people in every community, and then the blessed thing will follow.

Dr. BRYCE.—I wish to announce to the gentlemen of the Association that the local committee will be obliged if all those who desire to be entertained by the city to-morrow, by the carriage drive, will register their names so that we may know how many carriages to arrange for.

The PRESIDENT.—There will be a meeting of the Executive Committee this afternoon at the rooms of the Secretary, at the Rossin House, at half-past five. I am also requested to make known to the members of the Association that the members of the faculty of the Toronto School of Medicine request the pleasure of their company at a *conversazione* in the college, on Thursday, October 7th, at 8 o'clock P. M.

Dr. HOLT.—Can these invitations, to which we would gladly respond, be accepted without undue interference with the work of this Association?

The PRESIDENT.—I am sorry to say they cannot.

A DELEGATE.—I think we should take some notice of the invitation by conveying our high sense of the courtesy, and our regrets that we cannot accept it.

The PRESIDENT.—I understand from the members of the faculty that they would be glad to see the members of the Association at the *conversazione* after the adjournment this evening.

Dr. BRYCE.—I do not understand, sir, that your remark with regard to these entertainments interfering with the business of the Association applies to the proposed carriage drive?

The PRESIDENT.—Oh, no.

Dr. C. W. COVERNTON.—I have here an invitation to the members of the Association from the manager of the water-works to make a trip



around the bay on Friday for the purpose of examining the condition of the water at different points.

Dr. McCORMACK.—I will move that the invitation be accepted, and the hour fixed at 3 o'clock on Friday, as our business will then have been concluded.

The motion, which was seconded, was put to the meeting and carried.

Dr. MERCER, of New York.—Dr. Wight has alluded to the case conveyed by the sleeping-car Malmo, and to the question of steamship vaccination. I am reasonably familiar with that case, and I believe the steamship was at fault. The passenger came in the intermediate cabin of the ship *India*, and it is very evident that there was connivance on the part of the steamship company and the surgeon of the ship to cover up the small-pox which was on that vessel. Either the surgeon was extremely ignorant, or he connived with the company for commercial gain. The case got on to the Malmo and passed through the state of New York to Chicago, and there I believe it was recognized; and if I am rightly informed the sleeping-car Malmo had already been disinfected on account of the small-pox, but the disinfection failed to be effective. In Syracuse the infection had developed in the person of a brakeman belonging to the sleeping-car. We had the small-pox introduced, and though many were exposed to the infection, we were fortunate enough to curtail it with but two or three additional cases. I consider that the examination of passengers on steamships is of prime importance in preventing the introduction of small-pox into the country.

Dr. PLUNKET.—I move the adoption of the report of the committee.

The PRESIDENT.—It is impossible to adopt it at present.

Dr. GIBON.—The proper course, as I understand, is that these resolutions should go to the Advisory Council. We are forgetting the functions of this Council, which was appointed for the very purpose of considering questions of this sort. I move that the resolutions be referred to the Advisory Council.

The SECRETARY.—Here is a resolution by Dr. Rohé on the same subject.

Dr. HEWITT.—I would like to know why the report of the committee cannot be accepted and the resolutions referred.

Dr. GIBON.—Yes; that can be done. I move that the report of the committee be accepted, and that the resolutions accompanying it be referred to the Advisory Committee.

The resolution was carried.

Dr. PLUNKET.—I move that the report, exclusive of the resolution, be adopted.

The motion having been seconded, it was put and carried.

The Association at 1 : 40 P. M. adjourned until 8 o'clock P. M.

## EVENING SESSION—8 O'CLOCK.

The Association having been called to order by the President, was opened with prayer by Rev. Dr. Nelles, principal of Victoria University, Cobourg.

The PRESIDENT.—The first business in order is a paper on “An experimental study in relation to the removal from the air of the dust or particulate material supposed to produce yellow fever, small-pox, and other infectious diseases,” by David Prince, M.D., Jacksonville, Illinois. (See page 164.)

During the reading of the paper, the technical details of which Dr. Prince illustrated by reference to a chart suspended on the wall,—

Rev. Dr. NELLES said,—Pardon me, Mr. President, but we are very anxious to hear this interesting paper, and we would be very much obliged if Dr. Prince would speak a little louder.

Dr. PRINCE.—I may state that I have experimented on this hall as a whispering gallery, and I found that while those near to the platform, within the range of these posts, cannot hear a word, those immediately back of them can hear better, while those in the rear of the hall can hear perfectly well.

[NOTE BY STENOGRAPHER. For reasons above indicated, some of the speeches made in the course of the following discussion were very imperfectly heard at the stenographer's table.]

On the conclusion of the paper,—

Dr. PRINCE.—I may say that if I have not made myself perfectly clear, I shall be glad to answer any questions that may be asked.

The PRESIDENT.—The discussion is now open, and speeches will be limited to five minutes each. Before, however, the discussion begins, Dr. Bryce wishes to make an announcement.

Dr. BRYCE.—Executive officers of the Ontario Associations will be kind enough to meet in one of the parlors up-stairs at nine o'clock.

Dr. SALOMON, of Louisiana.—I have been much interested in the paper read by Dr. Prince, and the explanations which he has given. But it has occurred to me that in all cases of this kind, for instance, in the case mentioned by the doctor himself, of an outbreak of small-pox on board ship, the infection would spread by means of the doors and windows of the room in which the sick person was confined, as it would be necessary to open them to admit the physicians, nurses, and so on. I would ask what arrangements it is possible to make in an apartment such as the doctor has described to prevent the contagion from being disseminated through the vessel by means of those apertures which it is necessary to have in rooms of this kind.

Dr. PRINCE.—My answer to that question would be, that there are two fans working, and when the fan which blows the air into the room is stopped, the second is put in operation.

Dr. SALOMON.—As I understand it, we simply have a room in the condition in which such apartments ordinarily are, with the addition of

these fans and the filtering apparatus. For instance, if a person is confined with small-pox, and there is no fan going, the infection passes out and in as the door opens and closes when people are going in and out. Now that is just the ordinary danger of infection from a sick-room. The particulate matter of the air must go through these openings, and if we stop the fan we have the room exactly in the same condition as a sick-room ordinarily is, or an apartment on board a vessel. It seems to me that in an arrangement of this kind, there should be some plan by which this difficulty could be obviated.

Dr. PRINCE.—As I stated before, I am supposing that there are two fans working, so that one or the other will always be in operation.

The PRESIDENT.—If there is no further discussion, the next order of business is a paper on “Six Years of Sanitary Work in Memphis,” by G. B. Thornton, M.D., president of the Memphis Board of Health. (See page 109.)

The paper, the reading of which was received with applause, was illustrated by references to an accompanying diagram.

Col D. P. HADDEN, of Memphis, Tenn.—Memphis has been such a prolific subject for discussion, and Dr. Thornton has made so true a report of its condition, that I fear anything I can say will add but little to the information already given. Everything Dr. Thornton has said is strictly true with but one exception, and that is, I think he has put our population too low. He admitted a population of 62,500, and he put the death-rate in proportion; but I think we have a population of 75,000, and that would certainly reduce the death-rate about ten per cent. The sewer system that we have in Memphis has been a very great success. It is, I believe, the best system that we could have introduced into that city; but, as Dr. Thornton remarks in his report, the two lateral sewers are too small. They are fifteen-inch sewers, and I believe they should have been at least eighteen or twenty inches. We discovered that defect, and we made other improvements, and now we claim that we have a perfect system. Of course the honor and credit of producing this system is due to Col. Waring and the National Board of Health. Some people may be opposed to the National Board of Health, but Memphis is not. [Applause.] We have seen its good effects; we will always recognize them, and revert with pleasure to its action in our city. I think it would be to the advantage of any city situated similarly to Memphis to try our system of sewerage. The main thing is that we think it is entirely free from sewer-gas. I may say this flushing water is intended to be turned on once in twenty-four hours, but we generally have the men at it five or six times a day: that is a matter between us and the water company. We think that an improved system of water-supply, which we have never had yet, is a great desideratum, and we will seek legislation at the next assembly to enable us to own our water-works, and seek a new source of supply. Mr. Herman made a report on this question sixteen or eighteen years ago, but the water was obtained by a private company who own the water-works, and it was obtained from too low down the



river. When we get the water-works ourselves, if we take it from the Mississippi river, we expect to get good, pure, clear water, and then we will feel that our system is perfect. Under the present system, during certain months in the year, the solid matter of the water is apt to clog up the sewer. Col. Waring, in devising the system, did not calculate on this fact, but calculated, I have no doubt, on our being able to get pure water. Another thing which he did not calculate on was, that Memphis would improve and increase as rapidly as it has. He expected that we would go on with 30,000 or 40,000 inhabitants. He did not think, in fact, that anybody would come there to live, for people were almost afraid to come there and stay all night. Now we have a population of 75,000, and so we must make these other improvements. With the intercepting sewer completed, and with a supply of pure and clear water, we think we will have sufficient sewerage there to improve our health-rate even if we should have 200,000 people, as we will have before long. [Applause.]

Col. GEORGE E. WARING, C.E., of Newport, R. I.—Mr. President, there is little to be said about the details of this system of sewerage in addition to what Dr. Thornton has said in his description of it, and the amiable remarks in which Col. Hadden has accounted for some of its shortcomings. I feel especially interested in the subject, of course, because the system has one or two faults, for which I am in some measure responsible. Its great fault, however, is one for which I am not responsible, and that is the outlet of the main sewer into Wolfe river. It was necessary during construction to secure an early outlet, and also to secure permanently an outlet for special occasions, that is, when the water of the Mississippi is so high as to bring the flow line to a certain height; but during the greater part of the year, and especially during the late summer and the autumn, when it is most important that everything should be delivered freely, the whole sewage was to be delivered down to the Mississippi river. A twenty-inch iron pipe was bought for that purpose, and laid on the bank, as I supposed, before the work would be carried out. It was not done during the summer of 1880, when the early work was substantially finished, but it was promised that it should be done later. It never has been done, and the main outlet of the system is Wolfe river, which is wrong, which may or may not do great harm, but which is certainly a feature of the scheme that I wish it distinctly understood I am not responsible for. Another defect is in the division of the main sewer at a particular point, a fifteen-inch main going on one side of the bayou, and a twelve-inch going on the other. The capacity is too small. I am responsible for that only to the degree of not having used the power and influence which at that time I suppose I had, to insist on the larger size that I thought would be better. But the financial question at that time was a controlling one. The estimate for the whole cost was \$225,000, and the tax which was levied was, I believe, two cents. This tax, which was a heavy one for the community, would raise but little more than the amount needed for the completion of this work; and what

was not to be spent for sewerage was to be spent for pavements. The vitality of the town depended on its industry, which was the handling of cotton; and the handling of cotton on such streets as they had was almost impossible; so that there was always that feeling to be contended against,—that the sewers must cost as little as possible, in order that there might be something left for the necessary paving of the streets. It was finally concluded after discussion, and to my regret I assented to that conclusion, that the mains should be made of that particular size, and that when they were found to be too small another main should be laid down the bayou to take the place of those first laid. It was supposed that the mains were large enough to last for ten or fifteen years at least, and that then extra ones could be built without imposing an onerous tax on the community. The assumption was that the population would grow slowly, and that the people would use their water-supply somewhat as other communities do. The population has grown very much more rapidly than it was expected it would, and there are two conditions which have led to an enormous consumption of water. The first is, that at certain seasons of the year the water of Wolfe river is so loaded with mud that unless it is allowed to flow freely through the house pipes and drains to wash out the mud that accumulates, they become so choked up that there are actually numbers of taps left constantly open for days and days together, the supply of water, according to the water-works company, amounting to something enormous. The other circumstance to which I refer is the fact that Memphis is very inadequately protected from the cold. Owing to the warmth of the climate sufficient protection is not made against frost, and when frost does come it does great damage to the plumbing; and when you add to that fact the temptation of the people to open the taps whenever the weather is cold, you have the conditions to which are to be attributed the fact that the mains are of too little capacity in dry weather. There has been some surreptitious introduction of roof water into the sewer system here and there, which has led not to the crowding of the six-inch laterals, but on several occasions to the overflowing of the mains. This will be relieved by the twenty-four-inch intercepting sewers, which will carry away the sewage of a certain portion of the town from the old mains. There is another question concerning which I have been asked so many times that I will make an explanation here. It is stated that it was an essential feature of the plan of the sewers that there should be no manholes. That is not at all the case. The plan as originally proposed included the construction of manholes at the usual intervals; but as it was found that the total cost of the manholes was, I believe, somewhere between \$20,000 and \$25,000, I agreed—without any reluctance at all, I may say—to the abandonment of nearly all of these manholes, in order that the money might be used in a way that would do more good. In the east main of the main sewer I had three manholes built, and since then three more have been added. In the laterals as built there were none at all, but since that time six have been built on about thirty-four miles of lateral

sewers, all of them being placed where there were special circumstances which led to repeated obstruction. For more than two years past, there has appeared to be no occasion to increase the number of manholes, and I have been led to believe, from the experience of this system in Memphis, that for small pipe sewers, for sewers which cannot easily be reached, manholes are much more a source of obstruction than they are a useful means for the removal of obstruction. It is difficult, even when the covers are provided with locks, to lock them so securely that malicious or mischievous persons will not be able to open them. It is a matter of small consequence if a person throws into a three-foot sewer or a twelve-inch pipe any object he may want to get rid of, but it is a matter of great moment to throw an obstructive object of any sort into a manhole connected with a six-inch pipe. In the construction of this system in other places I have always insisted on there being no manholes on small sewers, and have insisted also that in all sewers of ten inches diameter or less the manhole should not be into the sewer, but should only serve as a chamber at the bottom, opening into the sewer so that it can be reached when necessary. My only apology for occupying so much time is the fact that my interest is very much wrapped up in this system, which is the first system ever built in the world from which storm water was excluded. There have been constructed for nearly forty years past in England extensive systems that are called separate; but they are separate only so far as ground water or street water is concerned. The sewerage system of Tottenham took in only a portion of the roof water, a small portion, but the present system there admits roof and yard water, but excludes street water. The Memphis system admits no roof water whatever except surreptitiously, as I have mentioned, and there is an ordinance against its admission. [Applause.]

The PRESIDENT.—The report of the Committee on the Disinfection of Rags is now in order.

Col. GEORGE E. WARING, of Rhode Island.—I move that the report be laid on the table.

The PRESIDENT.—The Association has ordered the presentation of the report of the committee, and it would be unusual, to say the least, to lay it on the table.

Dr. A. N. BELL, of New York.—According to information I have received from a member of the Executive Committee, the time taken up in the paper which preceded this order of business was one hour and five minutes more than was calculated, and I think it is due to the importance of this subject, the disinfection of rags, that it should be dealt with by this Association, and not treated in the manner proposed by the gentleman who has made the motion.

The PRESIDENT.—The motion of Col. Waring, if it prevails, will involve the indefinite postponement of the subject. Is that the intention?

Col. WARING.—Yes.

A DELEGATE.—I second Colonel Waring's motion.



Dr. GIBON.—Is it in order, Mr. President, after we have created a committee, after we have appointed them to make a report, and they come forward with a report in obedience to our order, that they should be cut off in this way?

The PRESIDENT.—As I said before, it would be most unusual, and my first impulse is certainly to rule against the motion.

Dr. DEVRON.—I move that the motion to postpone the report of the committee be laid on the table.

A DELEGATE.—I second the motion.

Dr. McCORMACK.—Owing to the importance of the report of the committee and the limited attendance of members, I would ask you, sir, if it would be in order to move the adjournment, so that this report may come up in the morning, in order that time may be had for such consideration as the importance of the subject demands.

The PRESIDENT.—I think the arrangements already made for our work to-morrow will render it difficult indeed, and almost impossible, to carry over this report.

On the motions being put it was decided that the report of the committee should be presented.

Dr. A. N. BELL.—I thank the Association for the vote they have just given, and for not having repeated what occurred last year when the evidence showing the necessity for the disinfection of rags was choked off. Perhaps the importance of the subject may best be indicated by stating that the value of rags imported into the United States last year was \$5,194,951, a fact which touches the interests and the pockets of a large importing interest in this country to such a degree as to make them opposed to bringing forward the evidence with which this committee was ready last year, in a great measure, when it was moved to refer the report back to the committee. The committee now begs leave to submit a large amount of evidence, chiefly from recent sources, on the propagation of disease by rags, and their congeners, infected clothing. The following is the report. (See page 170.)

Dr. BELL.—The lateness of the hour will be my excuse for not reading all the facts which I have here, showing hundreds of cases where small-pox, cholera, and almost every infectious disease have been conveyed by imported rags, and their congeners, infected clothing. (Here the speaker read portions of the report of the committee.) It is known to those members who were present last year that Dr. Taylor, who was appointed chairman of this committee, but who could not be present at this meeting, and authorized me to act in his stead, reported two distinct outbreaks of small-pox near Springfield, Pennsylvania, which originated in an infection from imported rags. The members of the committee present assure me that they were in strict accord with that report. I have seen Dr. Raymond, and he also authorizes me to say that he was in perfect agreement with that report. Dr. Taylor, the appointed chairman of the committee, states that the evidence on this subject is so clear that we have nothing to do but to summarize that which we held to be sufficient

evidence upon which to base the report last year, which was objected to on the ground that the report was not sustained by the evidence.

The PRESIDENT.—I have to announce, on behalf of the local committee of arrangements, that the carriage drive for to-morrow afternoon has been arranged to leave the Rossin House at two o'clock.

Dr. CASSIDY, of Toronto.—I desire to know whether the meeting will adjourn to partake of the hospitalities of the city on that occasion, or, in case of members' absenting themselves from the meeting for that purpose, if the Association will continue its session. The object of the question is to form some idea of the probable number of our guests.

The PRESIDENT.—I will only venture to say that the usage of this Association has always been to postpone all pleasures of that sort to its business. It has, I think, never really adjourned for such purposes, though of course the Association can express its own opinion on the subject.

Dr. REED.—Could not the committee so arrange matters that the drive would start at three o'clock instead of two? It would be almost impossible to complete the work of the Association, get our dinners, and be ready to start at two without interfering with the work of the Association? If, however, we make the hour three o'clock, perhaps we would be able to do so.

A DELEGATE.—All those who intended taking part in this drive were invited to register their names, and I understand that there is a record of that kind which the local committee can refer to.

It was moved and seconded that in the opinion of this Association it will not be practicable to take part in the drive proposed by the city before three o'clock to-morrow. Carried.

Col. WARING.—I rise only to make an explanation, which I think due no less to myself than to the members of this Association, of the reasons why I opposed the introduction of the report which has just been presented. I had two reasons. The first is, that the evidence is not clear that any epidemic—and I think I would be safe in saying any case of an epidemic disease—has ever been introduced into this country by the importation of foreign rags. The other is, that I have a very strong feeling that when any movement for the improvement of the sanitary condition of our people assumes a commercial form it should be tabooed by this Association. Nothing should be permitted to be done which can throw the least question on our scientific spirit or on the disinterested purity of our motives. Those were the reasons why I made a motion which, without this explanation, would seem to be a very rude motion.

Dr. DEVRON.—The reason I made the motion to lay Col. Waring's motion on the table was, that I believed there was sufficient evidence to show that not only epidemics, but various infectious diseases, had been introduced into this country by imported rags; and if these rags do not always produce epidemics, it is not because they cannot do so, but is owing to one of those fortunate circumstances by which we so often escape calamity. I do not believe that this Association should taboo any

subject which properly comes within the sphere of its investigation or action, simply because, forsooth, it may possibly interfere with commerce. We are not here to represent merchants, or dealers, or importers, or middle-men; we are here to devise the best means for protecting the health of the community at large. [Applause.]

Col. WARING.—The gentleman who has just spoken misunderstands my position. I do not want anything tabooed by this Association because our action might interfere with commerce, but I want to have tabooed any action on our part which itself assumes a commercial position. I think this Association should taboo any action which they believe to be designed to further any patent system of disinfecting rags. [Applause.]

Dr. McCORMACK.—It appears to me that the imputation which has just been made is one which is an insult to the members of the committee, whose names should be a sufficient guaranty that they are not interested in any commercial scheme, as has been suggested. I think that men who occupy the position of the members of this committee should have been spared such an imputation. [Applause.] They are men, some of whom have unselfishly devoted the greater part of their lives to the benefit of the people, and I think that the use of such language as Col. Waring has employed, suggesting that they were interested in the promotion of any such scheme as he mentioned, is entirely unwarranted, and out of place in this Association. [Applause.]

Dr. GERMER.—In the part of the country from which I come we had two epidemics which broke out from infection imported in rags. Three years ago we had two epidemics which were mostly caused from rags, and some of the men who opened the bales of rags were the first to die. I certainly think that some means should be taken to disinfect these rags and old clothing. The matter should at least be settled one way or the other, and we might at any rate oblige those who load these old rags on ships to moisten them. There is water enough to moisten them sufficiently to make them harmless. I think the Association should come to a decision on this rag business.

Dr. S. H. DURGIN, of Boston, Mass.—It seems to me that there is much which can be said in candor on this subject to enlighten members of the Association who have not had the same opportunities for studying it that a few of us have had. I cannot for one moment think that it was the intention of Col. Waring to impute any personal or interested motive to members of this committee in acting as they have, but I can quite well understand why Col. Waring made the remarks which he did. He undoubtedly knows, as I do, how persistent have been the efforts of men interested in a stock company for disinfecting rags by the patented process to magnify the danger from imported rags, and to create a popular sentiment in favor of disinfecting all imported rags on entrance into this country, whether infected or not, at the tune of five dollars per ton. There is a curious history connected with this whole rag craze. It began some two or three years ago, and the general government was induced



for a time to meddle with it. Coincident with this, or immediately after, a process for disinfecting rags in the bale was patented, companies were formed, and work called for. The general government soon dropped the matter and the local authorities again became responsible. The people had now been taught to expect cholera unless all the foreign rags were passed through the patent process. It did not seem to make any difference whether the rags came from an infected country or not: they were all to go through this process, and then they were all right. I have witnessed and examined this process most thoroughly, and, speaking from personal observation, I should say that it is an absolute failure. Some experiments have been made by members of this Association and others, showing that certain disease germs have been killed and metals have been melted; but these experiments have always been made by making holes in the bale of rags and inserting the germs or metals therein and then filling in the holes with rags. This makes an easy track for the steam heat to find the germ or metal. The steam heat is injected into the bale at a temperature of 500° F. and held for from three to eight minutes. It sometimes sets the rags on fire, but the heat does not reach all parts of the bale. I have repeatedly found cold knots of rags within the bale on its removal from an eight minute process, while the temperature in other parts of the bale was up to 400° F. So much for the disinfecting process, which is to be the great panacea for all the dangers which our friends tell us to look for in imported rags. Now as to the actual dangers from these rags. I have not been able to trace these dangers. I have heard a great deal of rambling talk about the danger of importing disease into our country by baled rags. You can arouse the popular prejudice in a moment when you talk about bringing rags into this country from the slums of Europe. It is the easiest thing in the world to get up an outcry against rags when you talk that way. But can we afford, as a body of scientific men, seeking to find and disseminate truth, to deal with the subject in that way? We should base our action upon well ascertained facts. Have we got them upon this question? Have we established the claim? I have not seen the proof. One third of all the rags imported into this country are handled in Massachusetts. We have investigated the subject there with a view of getting the facts, and failed to find any evidence to show that foreign rags had conveyed any disease into that state. Diseases have been known to arise from paper-mills in Massachusetts, but the instances have been rare, and in every instance the disease has been traced to domestic rags. The report of this committee deals with a mass of material gotten together in New York during the rag disinfecting excitement long before the committee had an existence, and deals with matter entirely different from the question of importing disease into this country in baled rags. I do not think this Association should be used or committed in the interest of any scheme for disinfecting rags. [Applause.] I would look after the importations of rags now—as I have at the port of Boston for the last nineteen years—with care, and would disinfect them when needed to protect the public health;

but I see no reason for this great bugaboo on rags to the neglect of other and actual carriers of contagion which we have to deal with in quarantine. [Applause.]

Dr. HOLT, of Louisiana.—I am proud to say that I was one of the signers of these resolutions; and after hearing all that has been said regarding this thing, in a deliberate way I propose now to sign it in bigger letters than I signed it before, and to go before the country and stand by what I have done. Now, here are some gentlemen who evidently have in their minds some facts, or what they suppose to be facts, relating to rascality, to some little villanies, some little speculations. That committee, when they signed that document, dealt with the question in its cold, abstract, scientific aspect. If you read the report of the decided cases, you will find that they are simply a citation of instances of declared infection through the medium of rags, and of turned off clothing, washed clothing, etc. Now, based upon that, just as you would have a full and impartial exhibition of the record of typhoid cases in a hospital upon which you would base certain action with regard to sanitation, your committee have drawn up resolutions which have not committed this Association, which have not by any construction committed any board of health to the actual disinfection of rags, and which have above all things sedulously avoided suggesting any manner or method in which the disinfection of rags shall be conducted. [Applause.] For my own part I know nothing about these little villanies; but I do know that if a ship comes in with a load of rags from Egypt, or Turkey, or Austria, or any of those countries where they have cholera, to the port of New Orleans, I am not going to ask this Association, or any man in New York or Boston or elsewhere, his opinion on the subject. [Applause.] I am not going to ask any man to look on the Board of Health of the State of Louisiana and say, "Now, gentlemen, do n't for God's sake say anything; do n't accuse us of speculation or rascality if we think it is advisable for us to disinfect these rags." [Applause.] We are going to disinfect them according to the manner we think best. Practically, I do not believe at all in the given methods, in the method in use in New York, because I think the work can be done in a cheaper and more expeditious manner. Suppose a ship were to come in there to the port of New Orleans with five hundred bales of rags: my business is to see to it that those rags are so thoroughly disinfected in bale as not to be accusable of any danger of infecting in transit. If these rags were consigned to a manufacturing company in the state of Louisiana, by the power which is resident in the board of health for that state I would follow up the rags to their destination, first having disinfected the bales. I would wet them thoroughly in their exterior with a strong solution of the bichloride of mercury, and I would follow them to the manufactory. I would see that when the bales were broken they would go into the boiling vats which are necessary to prepare them for manufacture; and if they were so treated I would have no fear of any contagion being introduced any further than I would in the handling which would be necessary in the

course of quarantine. That would be my idea of treating rags imported into the country at the port of New Orleans. Perhaps the Board of Health of Boston has another method, but the resolution gives each one of the various ports of the country the fullest control as to how it shall deal with cargoes of that kind. Now, to conclude my remarks, when you talk about that which implies a deep undercurrent of feeling, we should not open our mouths about quarantine at all, because I say that of all the rascalities which have ever been practised, in connection with official work of any kind, has been that which has occurred in the administration of quarantine. Why, it is open to these influences; and the reason I mention this is, that it is a principle which this Association maintains that there should not be levied upon the shipping of this country one dollar in excess of the actual amount necessary for the maintenance of quarantine. No quarantine has the right to levy a taxation upon commerce which is in excess of dollar for dollar of the actual necessary expenditure in quarantine; and if that principle is adhered to, there is no room for robbing commerce by any process that we may adopt. [Applause.]

Dr. ABBOTT, of Massachusetts.—I would like to say a few words by way of criticism, and by way also of correction. We have had a committee appointed to give us a report on the subject of infection by rags. But all through this report, from beginning to end, the committee have dodged the subject, and have brought in another question which has nothing to do with the one that was referred to them, and that is the question of clothing, bedding, and things of that sort. There is all the difference in the world between a man's clothing and a bale of rags. It may be admitted that in the cholera epidemic of 1873 there were about three cases in which the disease was taken with the individual when he left abroad, brought across the ocean, and arrived with him when he landed on this side. Now a bale of rags has to go through a great many processes. There is the process of collection in the foreign country by the ragman, there is the baling of the rags, and all these different processes take a long period of time; and there is the time required to cross the ocean, after which another considerable period elapses before the rags go to the mill. Contrary to the wishes of this Association this question has been ordered for examination and investigation, and our state board of health have examined it and are now investigating it. The Boston common council held sessions lasting for fifteen days and covering a period of several weeks' time on this subject: they considered it very fully, they reported upon it, and I have their report in my hand. That report does not support the conclusions of this committee by any means. In the first place, from the beginning of the report to the end I am not able to find a single case of disease imported into this country by foreign rags. The cases which occurred in Massachusetts were from domestic rags, and if we are to report on this subject at all we should have a division of the subject which should recognize those two distinct questions. The law in England relating to this subject appears to cover the ground.



That law I should like to see in force here. Its principle feature is a very simple one, that is, that it is made a crime to sell rags which are infected in any way. If we adopted that principle we would be striking at the root of the matter. The report which was made to the city authorities of Boston makes this statement, that we find that the only contagious disease at the paper-mills which has been traced to rags is small-pox, and that only rarely; and that in all cases it was traced to domestic rags from large cities like New York and Philadelphia. This testimony is supported by sanitarians whose opinions were given in the matter, gentlemen who were summoned before the committee; and that committee, composed of six gentlemen who carefully considered the subject, made a report upon it, and I will read the report which they made. I think it makes a proper division in regard to imported rags. This is the report. (Here the speaker quoted the report of the committee in question.) I believe that we should not act in this Association unless we have the facts to act upon, and that when we have those facts we should make a proper division of them.

Dr. OTTERSON, of Brooklyn.—There are some few points in connection with the commercial aspect of this question that should perhaps be ventilated before this assembly. The fact of rags being considered as an infectious article, and one which may produce disease far and near, is, I think, conceded by all governments, by our state governments, and by the general government; and consequently they have authorized our consuls in foreign ports to see that rags are disinfected before shipment, and that bales of rags coming to this country, particularly those intended for New York or Brooklyn, should be accompanied by a consular certificate, which certificate is inspected by the quarantine officer at the port of arrival. These certificates set forth that the rags have been properly disinfected before being shipped. Another guaranty is that the consignees at the ports of arrival are required to give a bond that the bales shall not be broken in the cities at which they arrive. That is the custom in Brooklyn, and has been the custom for a long time. These rags are generally landed and stored in the ports of entry until such time as a sale has been made and they are distributed throughout the country. But accompanying all those rags is a consular certificate that they have been disinfected at the port of departure, and the certificate of the quarantine officer at the port of arrival; and, so far as I know, all these certificates are perfectly trustworthy, and are acted upon accordingly. In our state we look upon these documents as satisfactory evidence, and we act accordingly; we are careful and prudent, but without attempting to trammel commerce in any way by saying by what process or when these rags shall be disinfected. We do not take that question into consideration, because if they are not accompanied by the certificates I have mentioned, they are not allowed to land. I do not think that there has been a bale of rags landed, or offered to be landed, at Brooklyn, or offered for storage in that city since the 1st of February last, the commencement of my administration, without being accompanied by these documents;

and when they are accompanied by them we do not think we have any right to call in question the certificates of our own quarantine officers, or the certificates of the American consuls at the shipping ports. It is, I think, an important item which should be known to the public,—that precautions are taken by our state government and our general government, that so far as they possibly can protect their country it is protected, and that the danger of the importation of infectious disease by such means is recognized by them.

Dr. SALOMON.—For the purpose of getting an expression of opinion by the Association, I will move that the report be received and adopted, and that a copy of the resolutions which close the report be sent to all state boards of health having jurisdiction in maritime sanitation.

The PRESIDENT.—I would suggest that the motion must be divided. You may accept the report, but the resolutions must take the usual course.

A DELEGATE.—I move that the resolutions be accepted.

Dr. BELL.—I would like to have a few minutes to reply to some of the questions which have been raised.

The PRESIDENT.—You cannot speak again.

Dr. BELL.—Not after reading the paper?

The PRESIDENT.—I should hold that you have the privilege of closing the debate if nobody else wishes to speak.

Dr. H. A. JOHNSON, of Chicago.—Is it in order to discuss the report?

The PRESIDENT.—Certainly.

Dr. JOHNSON.—While it is quite true that foreign rags may come into this country free from any source of infection, it is also true that when they come stored away in ship loads we cannot tell until they are landed on our shores what infection they may contain; we must take the small-pox and the cholera that may be shipped with them, as we cannot open the bales until they arrive at their destination. Now if the precautions which are taken abroad were thorough, if they were well and thoroughly carried out, they would bring some kind of a guaranty that these bales of rags were free from infection. But can we accept them? I confess myself that observation and inspection of some of them lead me to feel a distrust that these precautions are more or less tainted by commercial considerations, and therefore I must say that when I see a cargo of rags coming to our shore it always suggests to me a certain possibility of danger, it may be cholera or small-pox, or perhaps diphtheria or scarlet fever, or one or other of those diseases which we generally regard as contagious; and therefore while I would not say that all bales of rags are dangerous, yet in my mind they are something like what Dr. Holt, in his paper on yellow fever, mentioned as suspected cases. As to the statement that those who advocate the disinfection of rags wish to make money by some particular process of disinfection, I do not think we have any right to inquire into that matter at all, one way or the other. No matter how base may be the motives at the bottom of any matter which comes before this Association, it is our duty as a body of scientific

men and sanitarians to investigate it, just as much as if the motives were the purest that could be acted upon. If the devil comes here with a question for consideration that comes within the scope of this Association, or if an angel comes with such a question, we have nothing to do with either the devil or the angel; all we have to consider is the thing itself: that is what we have to investigate. I am desirous of seeing the importation of rags carefully guarded, and I think there should be some expression of opinion on the part of this Association that there may be some danger bound up in a bundle of imported rags, just as there may be in a bundle of domestic rags. We all know that diseases are borne from house to house by fabrics which may become rags, articles of wearing apparel which may carry the infection of diseases, like diphtheria, small-pox, or scarlet fever, from one house to another in our large cities. I think we ought in some way to express an opinion that there is a certain degree of danger in the importation of foreign rags. Dr. Holt has given us an account of how they managed the yellow fever in New Orleans; but they may require a different treatment in Boston, and we have nothing to do with the treatment or the modes of procedure of different individuals. I do not think we should express an opinion about that, but should leave it to the good sense of the various local authorities; but on the abstract question that every bale of rags may be the bearer of infection to this country, it seems to me that we ought to express an opinion. They are at least suspected cases, like Dr. Holt's cases of yellow fever; and at any rate I think the Association should declare itself on the matter.

Dr. VAUGHAN, of Michigan.—We have here the report of a committee appointed by this Association. The majority of us, whatever has been said with regard to the honesty and integrity of that committee, believe that the members of that committee are honest, intelligent, and capable men; at any rate, they were appointed by this Association, and evidently they have bestowed some labor on this question. The resolution which has been proposed will, I presume, go before the executive committee. I move that the report be accepted.

The PRESIDENT.—That motion is already before the house.

Dr. VAUGHAN.—I second it.

The PRESIDENT.—It has been seconded.

Dr. VAUGHAN.—I wish to move its publication.

The PRESIDENT.—I assume that the doctor has a right to have it go to publication. Does he insist on the motion?

Dr. VAUGHAN.—I have no objection to Dr. Bell having the floor.

Dr. HEWITT.—It seems to me that there is a considerable mixing up of the present controversy with the scientific question. Let us look at the matter, as Dr. Johnson proposes, from a purely scientific standpoint. I would like to ask, if there are any gentlemen here who have had to deal with the rags actually imported into the country, if they do not always consider that rags are a suspected article. I suppose there is no doubt about that. And if rags are a suspected article, what method have we



actually in use to-day for differentiating between one class and the other? And if there are to be any pistols and coffee for two, let it be done outside of this hall. (Laughter.) It seems to me that the condition in which rags arrive before they receive any treatment, the condition in which they are stored when they arrive at their destination, and the handling they receive, are important points to be considered by those who are actually dealing with the question every day. I think myself that it would be wrong to confine the Association to any particular method, and I think that there is a difference between accepting the resolutions and the report. Now, sir, take the facts as they stand, and when the transactions are published, the report will cover so many of these resolutions.

The PRESIDENT.—I wish to remind you that you are not speaking to the question; the question is simply the discussion of the paper.

Dr. HEWITT.—Then I beg pardon; and I should like only to ask these questions of any gentlemen who have had this practical work to do, if means are not now habitually taken to make this differentiation, and deal with these articles accordingly, and if the resolutions are such as to justify the methods now pursued.

Dr. DURGIN.—May I be allowed, Mr. President, to answer the question? It has been the custom in Boston, I believe, for the last twenty years, to make a distinction between infected rags and non-infected rags. I think I saw the first cargo of rags that ever was stopped in Boston. I regarded them as infected rags, and I treated them accordingly. I am only astonished that the question of rags should be taken by this Association from the local authorities. I do not see why we should not just as well take up some other article which we import, and treat it in a particular way. It has always been the custom to distinguish between infected and non-infected rags, and to treat those which are infected in a particular way.

Dr. DEVRON.—I would ask the indulgence of the Association to speak again on this subject.

The PRESIDENT.—You can do so if there is no objection; it must be unanimous.

Dr. DEVRON.—When we give instructions through this committee we simply give our teachings for what they are worth, and boards of health and health authorities, or those in power, may use them as they see fit. As to the question as to our right to give advice on the subject of rags, we did not select the subject of rags alone as rags, but as one of the subjects which came up before this body for discussion as one of the sources of danger to human life; and there is nothing more irrelevant in our dealing with the question of rags, than it was for us, coming as we did from the four quarters of this country, to tell the good people of Toronto where they should build their sewers. They have asked our opinion on that subject, and we do not blame them for doing so; when they pass their by-law they will show whether they approve of our ideas or not. I claim that we have some right to come before

this Association and say that we are in danger, that our families are in danger, that the people whom we represent are in danger, from the rags which come from various countries; and that though we have not the power of saying that you shall quarantine or disinfect them, we have the right of telling them that we believe you should disinfect them, and disinfect them thoroughly, so that we may be sure that no rags which you may import shall be the means of bringing pestilence to any of our families. We have the right to give that advice, and to let boards of health act upon it if they please; but there is a higher court, a court of conscience, to which they must answer if they do not exercise such a supervision over these imported articles as will preclude the possibility of their being the means of scattering disease throughout the country.

Dr. REED, of Ohio.—The question has been asked several times why other things besides rags should not be included in this report. It is not supposed that we are going to take the silks or even the cotton goods from children who have scarlet fever, or any other of these diseases, and send them out to be sold. Any person who knows anything about goods of this kind knows that they stand on an entirely different footing. Any person who knows about the gathering of rags, knows that the dirtiest and filthiest rags are put into bags for sale, and that no care is exercised in collecting them. We know that rags taken off scarlet fever patients, or patients suffering from measles and other diseases, are crammed into bags and sold without any disinfection whatever, and that by this means infection is liable to be carried by these rags wherever they may be sent. In our own state, rags are used constantly for wiping engines and machinery, and it is a fact that persons who have used rags for these purposes have carried home to their families the seeds of disease which can be traced to no other source. There is no question that these rags are more fruitful as a means of spreading disease than any other class of goods we can handle; and there is no doubt that these rags are a great source of danger in carrying disease from one locality to another. That being so, the question is, Is this Association going to protect the people against this means of infection, or no? What is the difference to us how those rags are disinfected? It seems to me that the only question for us to consider is, whether these articles are a source of contagion or not. If they are, some method should be employed as a means of disinfection which will be successful in attaining that end.

Dr. A. N. BELL.—First, as to the question raised by Dr. Durgin and Dr. Abbott, in regard to the practice of disinfection being of recent origin and in the interest of certain patents, etc. What they say is true in so far only as, until recently, no attempt has been made to disinfect such materials, because it was only recently that we have learned how to disinfect them: until recent years such merchandise was kept in quarantine,—detained without disinfection until frosty weather set in, and finally allowed *pratique* to propagate infectious diseases whithersoever they went. I know the history of quarantine long enough in New York to know that it is only since the law of 1863 that there has been any attempt

to disinfect rags, and that it has been the uniform system to detain them from whatever time they arrive until frost should set in. To the base insinuation of Colonel Waring, who, in the interest of the paper-stock importers, desires to suppress the evidence again—as it was by the same influences suppressed for one year by their tactics at the meeting in Washington in 1885—the baseness of the insinuation by the distinguished engineer, who would have us believe that he knows as much about the importance of disinfecting rags as he does of laying sewer pipes, is to be accounted for only on the ground that he measures the motives of others by a consciousness of his own impulses and practices. Familiar with the purposes of this Association from its origin, and as chairman of the committee appointed to deal with this question, I spurn his insinuation as an insult to this body. Dr. Reed has very properly suggested that it would be hard to distinguish between the underclothing of children dying of small-pox or scarlet fever, and the class of materials which are usually designated as rags. He points out that we should hardly be able to distinguish between rags, and those articles which I have described in the report as their congeners. I might go further, and say that there are frequently found articles of clothing cast away from hospitals and so on which can hardly be described as rags. I have seen within a month a whole corset cast off in this way, and other articles of clothing which are loosely described as rags; and it is for that reason that I have described the subject with which the committee were called upon to deal as “the disinfection of rags and their congeners.” As to Dr. Abbott’s allegation that no evidence has been given of epidemics having been propagated by imported rags, I would simply refer you to the citations, which I have just read, of two epidemics of small-pox, a little more than one year ago, in Pennsylvania, distinctly traced to rags imported to the port of New York. I would also refer you to the record of the Massachusetts State Board of Health, which has already been alluded to, and of which board Dr. Abbott is secretary. With regard to the different methods which might be adopted for the purpose of disinfecting rags, I feel that you would all trust Dr. Holt, after his experience, to disinfect thoroughly any rags that might arrive at his port. But is he the only man that can do so? With all due respect to him, I would say that I have seen them disinfected in other places. I referred to the practice in the state of Massachusetts, and I do not believe that she is infallible. I said that of nearly 135,000,000 pounds of rags which have been imported into the United States during the last fiscal year, no less than 95,000,000 came into the port of New York, and only about 30,000,000 to the port of Boston. So I would say that we of New York, as well as of other places, are a good deal interested in this question. At Philadelphia a good many were imported, and some at New Haven. I have heard the different opinions which have been advanced on this subject with a great deal of respect, but I do not believe that the paper-mills of Massachusetts should control the maritime quarantine of the United States. I do not know, Mr. President, that I should add another word to what has been said. I believe a



good deal in the principle of hitting the head of an unsanitary evil, such as I believe this is, whenever it pops up ; it is our duty, whenever we can render a service to the public health, to do so, without regard to commercial considerations ; and if the importation of foreign rags is a danger to the public health, if the present method of treating them is a bad feature of our quarantine laws, then I say there should be no option allowed which would permit the evil to be distributed throughout every part of the country. As I have before said, one half of the paper has not been read. I only read a few of the authorities given, but those authorities are most conclusive, and I hope that the evidence we have presented will have its due weight with this Association. [Applause.]

Dr. SALOMON.—I move that the report be accepted.

Dr. VAUGHAN.—I move that the motion be amended by adding the words “and ordered to be published.”

The PRESIDENT.—The Association, by its by-laws, has made a regulation regarding the publication of any papers or documents that may be presented to it. The paper will go to the Publication Committee in any case ; the constitution provides for the course which Dr. Vaughan has suggested.

Dr. VAUGHAN.—Can we order it published independent of the Publication Committee?

The PRESIDENT.—I should question that.

Dr. VAUGHAN.—I think the Association has ordered certain reports of committees published directly.

The PRESIDENT.—I make that decision ; you may appeal from it.

A DELEGATE.—Perhaps Dr. Vaughan means, to publish it, independently of the proceedings, in the form of a pamphlet.

Dr. VAUGHAN.—Yes, that is what I meant.

The PRESIDENT.—It is not so stated in the motion.

Dr. VAUGHAN.—I think we can do it.

The PRESIDENT.—Why not delay it until we have accepted the other motion? It is not a necessary part of the motion.

Dr. VAUGHAN.—I have no objection to make it a separate motion.

The motion that the report be now accepted was put to the meeting and carried.

The PRESIDENT.—Dr. Vaughan moves that the report be printed by the Association in separate form. The motion was not seconded.

A DELEGATE.—I second the motion.

ANOTHER DELEGATE.—How many copies?

The PRESIDENT.—It is not stated, and I would remind the Association that this involves the question of the expense of printing them.

Dr. VAUGHAN.—The number might be decided by the committee.

Dr. HOLT.—I think that question might be left to the Publication Committee, which deals with every point in connection with such matters, and especially the ability of the Association to publish it. I move to amend the motion by referring it to the Publication Committee, with full power.

Dr. VAUGHAN.—That destroys the motion; I do not know that an amendment can destroy a motion.

The PRESIDENT.—I should rule that it did not destroy the motion.

Dr. BAKER.—It will involve no great expense when the matter is in type, and I hope Dr. Holt will see the force of that consideration, and direct the Publication Committee to have the extra copies printed in separate form.

The PRESIDENT.—Will Dr. Holt state his motion in writing?

Dr. HOLT.—With that understanding, I will withdraw my motion in favor of the amendment.

The PRESIDENT.—Will Prof. Vaughan submit his motion in writing as required?

Dr. DEVRON.—Do I understand that it is the intention and the duty of the Publishing Committee to publish this report in full in the proceedings anyhow? Will the report appear in full in the proceedings?

The PRESIDENT.—They have the same privilege with this as with any other paper submitted, of cutting it down, or even omitting it.

Dr. DEVRON.—The motion is made under the idea that the report is to be part of the proceedings of this body, and that a certain number of copies may be obtained; but if it is not to be printed in the proceedings, then the result will amount to nothing.

The PRESIDENT.—In the natural course of things it will appear in the proceedings. There is no reason to suppose it will not; but I cannot control the Publication Committee of the previous year, and I do not know that the Association at this moment can.

Dr. VAUGHAN.—I move that the report be ordered to be published in pamphlet form, and I think it might be left to the Publication Committee as to how this form is to be secured.

The PRESIDENT.—I would remind the Association that you have only three minutes before Wednesday morning to act upon this matter.

A DELEGATE.—I move that the resolution be laid on the table. Lost.

Dr. BELL.—I move that it be referred to the Executive Committee.

A DELEGATE.—Does it not go to the Executive Committee as a matter of course?

The PRESIDENT.—Certainly, to the Executive Committee.

It was moved and seconded that the Association adjourn.

Motion carried, and the Association at 12 o'clock M. adjourned until 10 A. M. Thursday.

### THIRD DAY.

THURSDAY, October 7, 1886.

MORNING SESSION.—10 O'CLOCK.

The PRESIDENT.—The Association will please come to order. The Rev. Dr. Macdonnell will open the exercises of the morning with prayer.

Prayer having been offered by Rev. Dr. Macdonnell,—

The PRESIDENT.—Dr. Bryce will make an announcement from the Local Committee of Arrangements.

Dr. BRYCE.—Mr. President and Gentlemen: The order of business to-day is pretty well defined in the programme. There are, however, one or two other points of information regarding which the Association ought to be aware. This morning the session will continue until 2:30 o'clock, and the carriage drive will proceed from the Rossin House corner to visit the different parts of the city at 3 o'clock. Gentlemen, with their ladies, will be kind enough to be there at the time specified. I am further asked to intimate that the meeting of state boards will be held in the parlors of the Queen's Hotel at 5 o'clock. Gentlemen who wish to have their certificates filled out and signed for reduced railway fares can do so, by application to the Secretary at the door at the right of the entrance. Regarding to-morrow's trip on the bay, it may be stated that the steamer *Vivid* will leave the wharf at the foot of Lorne street, just south of the Queen's Hotel, at 3 o'clock.

A DELEGATE.—Will there be any carriages from the Queen's, or will they all be from the Rossin?

Dr. BRYCE.—I understood they were all to be from the Rossin House.

Dr. C. W. COVERNTON.—I understood that the carriages were first to start from the Queen's Hotel, and then to go on to the Rossin House. I beg to state that I have received a communication from Government House, and that Mrs. Robinson wishes it to be understood by members of the Association that Government House grounds will be thrown open to them at 4 o'clock, and that she hopes to have the pleasure of seeing as many members and their friends present themselves as possible. The letter states that the lieutenant-governor regrets that, owing to a previous engagement, he will not be present to receive members who may call.

Dr. OLDRIGHT.—Mr. President and Gentlemen: I merely wish to repeat the invitation which was extended yesterday to all members of the Association and their ladies to be present at the *conversazione* of the Toronto School of Medicine this evening. It commences at 8 o'clock; and in order not to interfere with the work of the Association, I may state that of course it will be kept up to a late hour, and that members of the faculty will be glad to see members of this Association, who cannot of course get away at 8 or 9 o'clock, after the hour of adjournment. The buildings will be thrown open, and there will be an opportunity of seeing our whole apparatus, and of meeting with the students and many of the medical men of the city and outside. We hope you will be able to attend in large numbers. The street cars will continue to run up to a late hour of the evening, and we will endeavor to have arrangements made so that they will run up to the time that the *conversazione* closes. The Parliament street cars run close past the school, and also run from the various hotels; they can be got at the corner of Sherbourne street by members of the Association going from here. I intend to try to make arrangements, if possible, so that cars may start from here after the close



of the meeting ; but in case I do not succeed, you can at any rate get the Parliament street cars at the corner of Sherbourne and Queen streets, and those cars pass right by the school door. Tickets may be had here, and members of the Association can obtain them from the Secretary, Dr. Watson.

The PRESIDENT.—Is it your pleasure that the invitation from Government House be gratefully acknowledged, and respectfully declined on account of want of time, or will you accept it?

Dr. GIHON.—I move that we gratefully acknowledge the invitation, and express our regrets that the engagements of the Association will make it impossible to accept it.

The motion, which was seconded, was put to the meeting and carried.

Dr. T. S. COVERNTON.—Gentlemen : As Chairman of the Transportation Committee, I would like to say that in the room adjoining this we will be prepared to-day and hereafter to sign railway certificates. I would advise those who wish to get tickets before leaving, to purchase them at the different railway offices here in town, instead of getting them at the railway stations, as it will save trouble. The Grand Trunk office is on the corner of King and Yonge streets, and the King street office of the C. P. R. is nearly opposite the Rossin House.

The PRESIDENT.—Announcements from the Executive Committee are now in order.

The SECRETARY.—The Executive Committee recommend the following names for membership. (See List of Officers.)

The PRESIDENT.—Gentlemen : You have heard the names of the gentlemen who have been proposed for membership. What is your pleasure?

On motion, the Secretary was instructed to cast the ballot of the Association in favor of the gentlemen proposed.

Dr. GIHON.—I rise to a motion of privilege, and I would request the stenographer not to report the remarks which I am about to make upon it. I would move the passage of the following resolution :

*Resolved*, That the members of the American Public Health Association send their fraternal greeting to their esteemed fellow-member, Dr. Thomas F. Wood, of Wilmington, N. C., Secretary of the State Board of Health of North Carolina, assuring him how much his absence has been felt and regretted, and of their warm sympathy for him in his illness, which they earnestly hope may prove less serious than he has been led to believe.

Dr. McCORMACK seconded the motion.

The resolution was unanimously adopted by a rising vote.

Dr. PLAYTER offered a resolution respecting pollution of water-supply by deposit of filth in lakes and rivers.

Dr. GIHON moved as a substitute motion that a special committee of five be appointed as a Committee on Water-Supply.

The PRESIDENT.—Both resolutions go to the Executive Committee. The next business in order will be reports from state boards of health, called by roll in alphabetical order.

Dr. Orme gave a brief verbal report of the operations of the California

State Board of Health, but his remarks were inaudible at the stenographer's table.

Dr. H. S. ORME, of California.—In reporting for the California State Board of Health, I may say that many things of an encouraging character could be said as to the present workings of the board, and, on the other hand, others not so satisfactory. Through the earnest efforts not only of the members of the board, but of the medical profession throughout the state, sanitary matters are now attracting more attention than heretofore on the Pacific coast. There are a great many important laws, and amendments to present laws, relating to public health, which it is very important should be called to the attention of our law-makers who meet in legislative session in January next, and which subject-matters are all fully alluded to in our biennial report soon to be published for general information. Like most other state boards of health in the United States, ours is more advisory in character than mandatory. Of course the question here presents itself of usurpation of power whenever we demand mandatory enactments, and legislators often hesitate to force on the people legal measures of such a character unless environed by proper safeguards against their arbitrary use. But sanitary measures in times of epidemic emergencies require prompt action, and a legal prescription rightly and promptly administered oftentimes saves a community from the ravages of the "pestilence which walketh in darkness." It is no abridgment of the liberty of the citizen to compel him to conform to proper sanitary regulations for the preservation of his own and his neighbor's health. Through the instrumentality of a monthly circular issued by our permanent secretary, which gives a record of the deaths and prevailing diseases throughout the state, we keep the profession informed; and as this circular is very generally copied by the press, we are thus enabled to reach the people and furnish them much valuable information and correct ideas in regard to sanitary work, prevention of disease, &c. We have also sent out from our secretary's office circulars on cholera, small-pox, yellow fever, &c., as rumors of the approach of these epidemics reached us, and these circulars have not been without good effect. Owing to our remarkably salubrious and healthful climate, our death rate should be much less than it now is; and I am confident it can be made less when we get the people to properly understand and obey the natural laws of sanitation, and refuse to use quack medicines and patronize quack doctors. Our San Francisco City Board of Health are active, faithful, and conscientious in the discharge of their duty to the people, and as they are located at the Golden Gate, the great *entrepôt* of the Pacific coast, this is well, for thus they assist our state board, and they have kept from our shores epidemics which might have proved very destructive and of long duration. Quarantine inland, and the securing of proper quarantine grounds and buildings at the Bay of San Francisco, have engaged a great deal of the attention of our state board for the past few years. It is of especial importance that these quarantine grounds should be established. We are constantly in danger of yellow fever

from Mexico and Panama ; of small-pox from China and Japan ; yet our quarantine facilities are not as effective as they should be. In case of the advent of any of these diseases, we have no proper quarantine grounds or buildings where infected vessels and passengers could be detained and disinfected, and the sick properly isolated and cared for. As is well known, yellow fever has menaced us for the past few years from Mexico, but we have thus far prevented its appearance in California by a vigilant inland quarantine, and the disease has made no nearer approach to us than Tucson, Arizona, and, so far as I can now recollect, but two cases ever got across the line of Sonora into that territory. But if we desire and expect exemption in the future, our state board must have a contingent epidemic fund placed at the disposal of the executive of the state, to be used only for the protection of the public against yellow fever and all other epidemic diseases. As to Arizona, it being a territory, we must continue to look to the national government to enforce the necessary quarantine regulations through the Marine Hospital service. They have done well under its present management, and I know they will continue in the good work. The great mass of the people in our state, as elsewhere, are careless and unthinking in sanitary matters, and for this reason all our state boards of health should be endowed with the most ample powers and means to take such measures as in their wisdom may seem best to protect the unthinking public from the consequences of its thoughtlessness. In conclusion, permit me to say that I am glad I came so far to be present at this meeting of the Association and the Conference of State Boards of Health, to listen to and learn so many truths in regard to sanitation, to which we are all devoted. And I hope, whenever any of the members of this Association shall visit the Pacific coast, they will make their coming known to our brethren of the profession, and we will be most happy to see them and to show them the advantages of our glorious climate, and convince them that we are anxious to place California, in sanitary as well as in all other respects, in the front rank. [Applause.]

Dr. C. A. LINDSLEY, of New Haven, Connecticut.—I may say that the Connecticut State Board of Health has been organized since 1878, and, considering the time it has been in operation, I fear that greater and better work ought to have been expected from it. But there are several reasons why Connecticut has not progressed more rapidly than she has. The work which is assigned to the state board of health is practically in two directions, which, though they are rather intimately related to each other, yet make two very distinct and different kinds of work. The one is the collection and registration of vital statistics, and the other is looking after the health of the community. The board of health is charged with the registration of the vital statistics, and the secretary of the board is made the superintendent of registration. The appropriation which was made to the board is nearly one half consumed in the salary of the secretary and such clerical assistance as he requires. A large part of the remainder is taken up in the cost of registration, which devolves upon



the state board of health, and, very strangely, they have to pay for the stationery used in the towns in which a registration is made. In other words, they have to supply all the records in every town in the state, and all the blank certificates, of course, and this consumes a large proportion of the appropriation, so that there is but little left to carry on the proper work of sanitation in the state. Then, again, the work of sanitation is very much hampered and restricted by the sanitary laws which are in operation. They were enacted long before sanitary science had reached its present status, and were adapted to the times and the modes of thought which existed twenty or thirty or fifty years ago. All of you who have lived in the Eastern states, and in old settled communities, know how difficult it is to disturb the conservative methods and the fixed habits of the people in order to get such laws changed. We have, however, made some progress in legislation, but it has been very slow, and our efforts have been more frequently defeated than they have been successful. I have to report, however, one success of last year, which I believe was a very important one. Before alluding to that more particularly, I would say that the local boards of health throughout the state consist of the boards of selectmen and the justices of the peace, with the privilege of adding to their number such resident and respectable physicians as they choose to elect. Of course such a conglomeration as that, such a compound body of men, who are mostly chosen with reference to other duties, cannot be expected to do very effective work as sanitarians. They have no definite knowledge of the subject, and for the most part are not particularly well qualified for the work; and as a result the work has been to a certain extent neglected. In many towns, for a good many years, there has been no organization; it has been wholly neglected, and it has been one of the efforts of the state boards to induce some action in a sanitary way in these towns to which I refer. The result has only been partially successful; but at the last legislature the state board of health submitted a proposed law, which was passed, requiring these towns, on the Wednesday following the first Monday in October of that year, to organize local boards of health by the appointment of officers; and they have already received from the state board circulars instructing them as to the mode or organization, and requesting a report of the officers elected. As I expect when I return home to receive this information, I hope to be able next year to make a better report as to sanitary work in our state. We have, however, done this much: we have prepared circulars with regard to the various infectious diseases,—small-pox, cholera, typhoid fever, diphtheria, etc.,—which we have freely circulated where outbreaks of these diseases have occurred; but inasmuch as the local boards of health have only heretofore done their work in an optional way, the work has not generally been effective. The state board have also begun in a crude way a monthly report of the mortality of different towns in the state. They have only, however, been able to give the figures in towns in the neighborhood of cities, because it is only in such towns that there are required permits of burial, which enable them

every month to make a report. In the smaller towns, in which there are no cities, the returns of deaths are made very irregularly, and are frequently delayed to the latter part of the year, and are even then very imperfect. But from the cities of Connecticut, ten in number, we have made for more than a year a monthly statement of mortality. In addition to that, we have secured from twenty-five or thirty other towns in the state regular correspondents, who have reported the sicknesses which prevailed in their several localities, and the general condition of health, and the information thus obtained has been included in the monthly report of the secretary of the state board. But there is no necessary connection between the local boards of health and the state board, and consequently almost all the work on the part of the outside boards is of an optional character, and therefore not anything like so complete as it should be. We hope in the next legislature to bring about a more efficient system than that. I would report, as one satisfactory result of the work, that there have been only two outbreaks of small-pox in the state during the past year, and in both cases it happened in towns in which there were active local boards of health. In Manchester, immediately on the appearance of the outbreak, every person who was in any way exposed to the contagion was quarantined, and they kept seventy-five persons in a little village quarantined for two weeks, which was considered very satisfactory work for a small village in Connecticut. In Norwich they did nearly as well, and in both places they prevented further spread of the disease. There is one way in which legislation has been put in operation effectively, and I will mention it; that is, the legislature at its last session appropriated the sum of \$5,000 to the state board of health, instructing them to make investigation, and such experiments as they thought desirable in the way of an inquiry into the pollution of streams, but they gave the board no mandatory powers to prevent such pollution, and the most they can do is to report what they have learned at the end of the year. Possibly, when they have reported, something further will be done and other legislation may take place. However, our state board is only an advisory board, and has not the powers which have been conferred on many of the Western boards. That, I believe, is all that I have to report of interest to the Association.

Dr. McCORMACK, of Kentucky.—I regret that, as the representative of the State Board of Kentucky, I had no intimation, until I saw the programme this morning, that reports from state boards of health would be called for to-day. What I have to say, therefore, will be very brief; and it will be simply to inform you that since the meeting of last year such legislation has been had in our state as puts the board upon a very much better working basis than it was before. We have been particularly benefited by having the machinery, so far as relates to local boards of health, perfected and extended; and I think I may say that all the powers have now been given to the state and local boards of health in Kentucky which they can possibly ask for or require, or which are necessary for the successful prosecution of their work. I believe we have secured all that the

state of public sentiment and the advancement we have made would justify. In one respect our machinery is peculiar: the local boards of health are appointed directly by the state boards of health, instead of by the local authorities. These boards elect their health officers, fix their salaries, and recommend to the authorities of the town, or of the county, as the case may be, what compensation the local health officers shall receive. In this way we believe we have been able, and will be able, to secure much more efficient local officials and bring them into much more direct communication with the state board than we could if they were appointed by the county or the town authorities themselves. As to the condition of the medical profession in the state, the law on the subject of registration of physicians is so defective as to be now practically the only barrier that stands in our way to progress, and if we fail in our work it will be the fault of the boards themselves, and not the fault of the legislative authorities. The state board is in excellent working order, and there is considerable enthusiasm among the local boards, and, I think, a general and increasing desire on their part to do efficient work. I believe, at the same time, there is a growing appreciation as to the necessity and the value of sanitary work throughout the larger part of the state.

Dr. HOLT, of Louisiana.—I simply wish to remind the American Public Health Association that the state of Louisiana still occupies her position on the Gulf of Mexico, at the mouth of the Mississippi, and that her board of health is still ready, as in the past, to do effective work for the interests of the people. [Applause.]

Dr. F. H. GERRISH, of Maine.—I have nothing very startling to report to the Association, this year, on behalf of our boards of health. Though we are only in the second year of our existence, we have been able to do some satisfactory work,—last year in the prevention of small-pox, and this year in fighting diphtheria. We are pleased to find that we have been honored with a large measure of public confidence, the people applying to us very frequently,—to quite as large an extent, certainly, as we could expect where there has been so little educational work done in the direction of hygiene. We feel so well satisfied with our work, and the people appear to be so well pleased with it, that we look forward to the next meeting of the legislature, in January, with great hope that our powers will be much enlarged and our sanitary laws improved, the board having at present simply advisory powers; likewise, that we shall receive more than the meagre appropriation of \$3,000 a year, which is the amount we now receive. We fully expect to be able at the next meeting to report satisfactory progress in all these directions.

Dr. S. W. ABBOTT, of Massachusetts.—The State Board of Health of Massachusetts is represented, at this session of the Association, again in its original form, as an organization for health purposes only. The union of the former state board with other departments, embracing different lines of work, proved to be inharmonious and unsatisfactory, and, after an existence of seven years, was abolished by legislative action, and a new board



established, in June last, upon almost the identical plan of that of 1869. The want of confidence which the people of the state had, in the pretext of economy, urged as the motive for the establishment of the conglomerate organization of 1879, was shown by the granting of an appropriation for the working of the new board, which was more liberal than that given to either of its predecessors. The present board consists of seven members,—three physicians, a lawyer, a civil engineer, and two merchants. The work of the board, as defined by the act which created it, is similar to that of the former boards of 1869 and of 1879. Its powers and duties are partially advisory and partially executory, coördinate powers with local boards being given to it in the case of certain contagious diseases, and also supervisory powers over noxious and offensive trades. In addition to these, by more recent acts, still more definite powers have been conferred upon it, in relation to food and drug inspection, with the operation of which this body has already been made familiar. This work constitutes a distinct and active department, conducted under the supervision of the board, for which purpose two inspectors and five analysts are constantly employed. The board has also conducted, under its general powers, special investigations, among which are an inquiry into the relation of rags and paper manufacture to public health; and also other special lines of work of a similar nature. A more recent act, entitled “An act to protect the purity of inland waters,” also gives to the board certain advisory powers relative to these most important matters, the water-supply and the drainage of cities and towns. Under this act, and for the purpose of carrying out its provisions, the board has organized a well equipped engineering department, having a consulting engineer, chief engineer, and assistant, and is already engaged in the active work authorized by the statute, which is herewith quoted in full:

## COMMONWEALTH OF MASSACHUSETTS.

[Chap. 274.]

## An Act to Protect the Purity of Inland Waters.

*Be it enacted, etc., as follows:*

SECTION 1. The state board of health shall have the general oversight and care of all inland waters, and shall be furnished with maps, plans, and documents suitable for this purpose, and records of all its doings in relation thereto shall be kept. It may employ such engineers and clerks and other assistants as it may deem necessary: *Provided*, that no contracts or other acts which involve the payment of money from the treasury of the commonwealth shall be made or done without an appropriation expressly made therefor by the General Court. It shall annually, on or before the 10th day of January, report to the General Court its doings in the preceding year, and at the same time submit estimates of the sums required to meet the expenses of said board in relation to the care and oversight of inland waters for the ensuing year; and it shall also recommend legislation and suitable plans for such systems of main sewers as it may deem necessary for the preservation of the public health, and for the purification, and prevention of pollution, of the ponds, streams, and inland waters of the commonwealth.

SEC. 2. Said board shall, from time to time, as it may deem expedient, cause examinations of the said waters to be made, for the purpose of ascertaining whether the same are adapted for use as sources of domestic water-supply, or are in a condition likely to impair

the interests of the public or persons lawfully using the same, or imperil the public health. It shall recommend measures for prevention of the pollution of such waters, and for removal of substances and causes of every kind which may be liable to cause pollution thereof, in order to protect and develop the rights and property of the commonwealth therein, and to protect the public health. It shall have authority to conduct experiments to determine the best practicable methods of purification of drainage or disposal of refuse arising from manufacturing and other industrial establishments. For the purposes aforesaid it may employ such expert assistance as may be necessary.

SEC. 3. It shall, from time to time, consult with and advise the authorities of cities and towns, or with corporations, firms, or individuals either already having or intending to introduce systems of water-supply or sewerage, as to the most appropriate source of supply, the best practicable method of assuring the purity thereof, or of disposing of their sewage, having regard to the present and prospective needs and interests of other cities, towns, corporations, firms, or individuals which may be affected thereby. It shall also, from time to time, consult with and advise persons or corporations engaged or intending to engage in any manufacturing or other business, drainage or refuse from which may tend to cause the pollution of any inland water, as to the best practicable method of preventing such pollution, by the interception, disposal, or purification of such drainage or refuse: *Provided*, that no person shall be compelled to bear the expense of such consultation or advice, or of experiments made for the purposes of this act. All such authorities, corporations, firms, and individuals are hereby required to give notice to said board of their intention in the premises, and to submit for its advice outlines of their proposed plans or schemes in relation to water-supply and disposal of drainage or refuse. Said board shall bring to the notice of the attorney-general all instances which may come to its knowledge of omission to comply with existing laws respecting the pollution of water-supplies and inland waters, and shall annually report to the legislature any specific cases not covered by the provision of existing laws, which, in its opinion, call for further legislation.

[Approved June 9, 1886.]

The board is ready to coöperate with the boards of other states in such active work as will advance and promote the general sanitary interests of the country, and is especially desirous that congress should give to the people an active, efficient, and progressive general organization which should have the confidence of this entire country.

Dr. J. H. KELLOGG, of Michigan.—I have been taken somewhat unawares in being asked to make a report, and have had no time to make an elaborate report, as, having left home in some haste, I was unable to arrange my material before leaving. Last year our board completed its work in the weekly collection of reports of sickness from correspondents throughout the state. The number of our correspondents has been increased, and at the present time we have representatives in every part of the state. There has been considerable question as to the value of statistics of this sort. Some people think,—at least in Michigan, and perhaps in other places,—that the data so collected are not sufficiently accurate to be of any great value; but the results which have been obtained by the collection and the compilation of these reports, and by a comparison of them with the meteorological reports which have been taken with them, show them to be of very great value. The secretary of the board, by the compilation of the reports of sickness from pneumonia, and a comparison of them with the meteorological reports in the same districts, has discovered the cause of pneumonia. He has ascertained the cause to be due to low temperature and lack of moisture in

the air, and has published a paper on the subject, which doubtless many of you have seen. It seems very desirable that this work, which was first taken up by Dr. Richardson and afterwards by the Massachusetts Board of Health, should be extended, as thereby some excellent results would be obtained. These results, however, to be useful, would require to be based on statistics collected for a large number of years, and it is obvious that the longer time they are collected the more valuable they become. It takes a long time to establish a positive relation between meteorological conditions and a prevailing sickness; but it does seem desirable that this work should be extended to other states. It was undertaken first in Michigan ten years ago, and has been kept up since, though it has been necessary to resist a good deal of pressure from those who look only to economy in such matters in consequence of the expense entailed. The board has been making special investigations for several years past, a special appropriation for this purpose having been set aside some three or four years. A number of years ago several cases of cheese poisoning occurred in our state, and endeavors were made to ascertain the cause. Specimens of this poisonous cheese were placed in the hands of a member of the board; and the results have been very important, as he seems to have discovered the real cause of the poison in such cases, and the probability seems to be very strong that this poison is also a frequent cause of cholera infantum and some of the other bowel diseases which occur in hot weather. Our board has also taken considerable pains in circulating documents as to the causes of typhoid fever and the means of preventing it, and other information in regard to this malady, which prevails so largely among the people.

Dr. C. N. HEWITT, of Minnesota.—Our board of health was organized in 1872. At that time we were given executive power to some extent, but since then our powers have been gradually increased, as well as the powers of local boards of health, until now we have an efficient system of coöperation and work. In the state of Minnesota there are 1,050 organized local boards of health, and there is hardly one which is not in direct communication with my office. The state boards and the local boards, besides having control of the infectious diseases of men, are also responsible in connection with those of animals, and the notification required is as complete for the one as for the other. Besides this work in connection with the control of epidemic diseases, we have a regular system of annual inspection, made by the local boards, but in connection with the state board. We have, further, the power of compulsory notification of diseases, so that any local board of health can compel the notification of the infectious disease of man or animals in every township, village, or city of the state, under a penalty. Further, we have the necessary function of compelling the coöperation of two or more local boards of health, if necessary, for accomplishing a particular work which may involve the territory of more than one board; and this of course gives increased efficiency to our operations when such a necessity arises. I might mention at the same time that some eight or ten years ago there



was organized a laboratory for the analysis of water and foods in connection with the office of secretary, and since its establishment a large number of analyses of water and foods have been made. It is the intention of the board, at the request of the regents of the university, to join that laboratory with the department of public health; but the matter has not yet been decided. In connection with our work, we began the publication nearly two years ago of a little monthly pamphlet, as a means of communication between local boards and the state board. It is the official means of conveying the announcements of the state board, and we find it a great convenience. I am glad to see that other states have tried the experiment since our pamphlet was established, and are apparently succeeding as well as we are succeeding with ours. We have nothing to do with the registration of births or deaths, or with the administration of the laws relating to the examination of candidates for degrees in medicine. The work of the local boards, so far as I am able to report, is increasing in efficiency, and we are doing fairly well in all departments of our work. In conclusion, it is only proper that I should recognize in the name of our board, and in the name of our people, the assistance which we have been afforded in our work by the work and transactions of this Association. By order of our board, I was one of the original members of the Association; I have been in constant attendance at its meetings since; and I come here to-day as a representative of our entire state in the work and interests of this Association.

Dr. E. M. HUNT, of New Jersey.—When we compare the condition of things in our state with what it was ten years ago, we certainly have great reason for encouragement; but still there are some things which are not altogether satisfactory. It has been to us an exceedingly important year, not merely because we have been gathering a popular increase of interest in matters pertaining to public health, but because we have had an entire reënactment and consolidation of all the laws of our statute book on these subjects, covering a series of laws, some of which did not fit in very well with others. I am glad to be able to state that the combined law is now everything that we could ask for, and that there is not a single feature of it which was not approved by the state board and the local boards. We have in existence now, I believe in every township of the state, a local board of health; and though some of them are not so efficient as we could wish, most of them are doing very good work. In our cities especially there has been a reorganization of the boards, which has resulted in greater efficiency than we ever had before. During the last year we have passed a law relating to oleomargarine; and the administration of that and other sanitary laws is under the efficient superintendence of Dr. Newton, who is doing good work in that direction. Popular information on the subject of public health is now such that we feel we have to study very closely how to keep abreast of the popular mind. We feel that one of our needs is that of skilled inspectors; and I may say that the law gives us both the power and the money to appoint as many district inspectors as we choose. The salary of the secretary of

the board is now independent of the appropriation, and not only our stationery and blanks, but all our office expenses, are furnished without reference to the appropriation, and there is left the sum of \$6,500 at the command of the board. Vital statistics, so far as they are obtained at all, are collected directly through the towns. We think that there is a defect at present in our law with regard to the construction of houses. We believe there is need of a law by which the construction of houses in our cities shall be carried on under sanitary oversight. I do not think that I need say anything more than that we are making progress in our state in regard to sanitary matters, and that the public is feeling an interest in such matters, which will sustain us in the work we are undertaking.

Dr. PROBST, of Ohio.—It is hardly necessary for me to inform members of this Association that Ohio has a state board of health, though it is of very recent birth. We have, however, commenced work, and we hope to do something in the future. At the present time we are having diphtheria widely prevalent in the state. When I left home it was reported from forty counties out of eighty-eight, and probably there are others from which we had not received reports. We have adopted the system of weekly health reports by voluntary contributions, but we have been fortunate in securing the aid of many of the physicians throughout the state, so that we are receiving reports from perhaps sixty counties out of eighty-eight. From these weekly reports of prevailing diseases we make up weekly bulletins, which are published in as many papers as possible, copies of which are sent to our correspondents, who in this way are encouraged in their good work. We were very glad to hear from Dr. Reeves, of Wheeling, that the people of that city were making an effort to dispose of their night-soil and garbage, as that is a matter of importance to our state. Soon after the creation of the board of health, an epidemic of typhoid fever broke out at Bellaire, Ohio, and the investigation which was made seemed to show that it was directly or indirectly due to the sewage from Wheeling, which was then disposed of by discharging it into the river, the intake of the water for Bellaire being about a mile or a mile and a half below the city of Wheeling.

Dr. BENJ. LEE, of Pennsylvania.—I take great pleasure in conveying the greetings of the State Board of Health of Pennsylvania to this body. I think no better evidence could be given of the interest which we feel in this Association, and the importance which we attach to its work, than the fact that its sessions during the present meeting have been assiduously attended by no less than three members of our state board of health, and that a fourth member, Dr. Edwards, wished me to convey to the Association his sincere regrets that owing to illness in his family he should not be able to be present. In addition to these facts, I may state that the city of Pittsburgh is also represented by three members of its board of health, and that our state board offered to pay the expenses of any of its members who wished to attend the present meeting. [Applause.] As you are aware, sir, our state board of health is yet in its infancy, but we trust that it will prove to be an infant Hercules, and that it

will yet strangle many a hydra head of disease and death. I am happy in being able to state that during the short period of its existence it has strangled two outbreaks of small-pox, and that it has also made several outbreaks of typhoid fever feel rather uncomfortable. We are peculiarly situated in Pennsylvania, and, owing to that peculiarity of position, only a portion of our work as a state board has been performed as satisfactorily as we should like. We have boards of health in our cities, we have boards of health in a few of our incorporated boroughs, but beyond that there is no provision by law for any board of health in the state saving the state board. The first duty of the state board is to answer appeals from the people for protection, the necessity for that protection being the motive which led to the establishment of the board. Hence we have been overwhelmed since our organization by appeals from every quarter for the suppression of nuisances, for the protection of water-supplies, and in various ways for carrying out what the people deem was the object of our creation. Hence the important subject of registration has had to take a back seat, and it will be a long time before we shall be able in our annual report to present the mass of statistics which appeared in so many of the reports. I mention this fact in order that you may not think that there is any deficiency of interest in this subject on our part, for we are deeply impressed with its importance, and regret that we cannot give it the attention it deserves. Stimulated by the example of Minnesota, Tennessee, and one or two other states, we have felt it important that we should have an official organ, and we have adopted as such official organ a journal which was already in the field of hygiene—*The Annals of Hygiene*, published by Dr. Edwards, a member of our board. We shall endeavor to make that journal one which will command the respect of the entire country, one which the entire country will feel to be a necessity, in order to the full comprehension of the present condition of sanitary science, especially as it exists in our state.

It is not unknown to many members present that our board inaugurated its efforts by calling a sanitary convention, to which were invited members of various boards of health and other sanitarians from all parts of the United States and Canada. The board takes great pleasure in recognizing the generous response which was made to the invitations which it sent out. I have been informed by a member of the Association on this floor, that in his estimation no sanitary convention ever held in this country presented such a mass of valuable papers to those who attended it as were presented by that association. Of course I would not say so myself, but I mention this simply as a voluntary tribute by a gentleman who was present. I do assure you that those papers which are now being published in our annals form a series of contributions to sanitary science which are well worth the perusal of any member of this Association.

DR. C. H. FISHER, of Rhode Island.—It did not occur to me that the reports of state boards were to be called for to-day. I may say, however, that in Rhode Island we are making progress in some respects. The



town councils of the several towns were the boards of health for several years ; but the statutes also require that the town councils should appoint one or more of their number, and that statute is complied with. It may be that in some of the more sparsely settled towns of the state, health officers are not appointed, but they are appointed, I think, in all the towns of any considerable importance ; and I may state that Rhode Island is generally thickly settled, and is almost a succession of villages from one end to the other. I think, therefore, that health officers are pretty generally appointed, and I am happy to say that for the most part they are intelligent men. They have some idea of the science of hygiene and of general sanitation ; they know what is required or needed in a village or township for the protection of the public, in the way of keeping premises clean, the condition of houses, and all those things which go to make up conditions favorable for health. During the past year there has been a cleaning up which is entirely unprecedented. Our health officers are like all other public officers : before they can do much, they must have the people behind them ; they must have public sentiment behind them to approve of what they do. And I am happy to say that the health officers of our state have, in a large majority of towns, an intelligent public opinion behind them ; that the people have some knowledge of hygiene ; and that being the case, these officers feel confidence in going ahead, and making needed improvements. With regard to the question of vital statistics, we in Rhode Island feel some degree of pride in the completeness of our returns of births, marriages, and deaths. In regard to deaths, I may say that undertakers are by law required, under a penalty, to make returns of the burials they perform. This is of course impossible in some instances, as undertakers are called to towns which are at some distance from where they live. Where it is shown that the intention is to comply with the law no action is taken against them, and the law is generally very well observed. Then, again, there is another method which we have taken some pains in having carried out—one that in one way is not required by law. There is a law requiring a yearly census of the school-children, and there is also a law requiring a house-to-house visitation, to collect statistics of births which have occurred in each town. Now the secretary of the board requested that these collectors should also return the deaths ; and every town in the state has complied with that request, so that we have really a two-fold method. Not only so, but we have distributed to physicians in some sections of the state, where we feared that the returns might not be complete, blank postal returns, to be filled up with the name, date, and cause of death. We have found that within the last few years the returns obtained in these two different ways agree very closely. Of course the undertakers have a strong interest in carrying out the law, so that they may not subject themselves to the penalty. Though there is in our state a law providing for strict returns to the state board of health, practically there are no such returns. It is entirely distinct ; there are no expenses in carrying on the registration that come within the appropriation to the state

board of health ; the expenses are entirely independent of the board, and so is the compensation. It is entirely in the hands of one individual, who controls the machinery necessary in making out these returns. I think I can say, without hesitation, that we have a method of obtaining returns of deaths that is as perfect as that of any other state in the Union. I may add also that we are making progress with regard to sanitary matters, that public opinion is taking a higher plane, that many of our citizens are acquiring a thorough knowledge of hygiene, and that this knowledge is going on by a leavening process which sooner or later will permeate the entire mass.

DR. BRATTON, of South Carolina.—I am pleased to be able to state that our state board of health is in a healthy condition, that it is in full operation, and that, according to the means furnished us, we intend to do our duty in carrying out all the plans and measures which we see proper to adopt, looking to the improved sanitary condition of the state. The state board of health is composed of nine members, seven of whom are physicians, and two of whom are laymen, the latter being the controller-general and the attorney-general of the state. The first great purpose the board had in view was to establish a public system of quarantine stations along the coast. That work has been so fully and completely carried out that they feel to-day that they occupy a safe position against the introduction of pestilential diseases from a foreign country. Though the board acts, it is true, as an advisory board, still it is authorized to locate sub or local boards through the towns and cities of the state, as well as in rural communities. These local boards are placed along the northern border of our state to protect that border against the invasion of any pestilential disease by way of the railroads that enter the state in that direction ; and they are instructed to take care of and provide for any cases that may be looked upon as suspicious, or that have actually developed. Having been so well secured against the introduction of foreign diseases by the coast, as well as along the northern border, the next great question—and it is the grand question now before the board—is this : The people of the country, those in the interior, ask also to be quarantined ;—now for what do they ask us for this quarantine ? As some members of this Association may be aware, along the rivers and creeks of our state we have a great deal of sickness arising from bilious fevers, malarial fevers, intermittent fevers, and other diseases of that kind. These diseases affect our people every summer and fall ; and, in order to protect the people against these diseases, it is proposed by the board that our legislature shall be empowered to enter upon a plan of draining our creeks and rivulets. It is remarkable how many thousands of acres of South Carolina stand utterly unprepared to-day to pay the taxes upon them. The owners have forsaken the land because they have not the means of carrying on this work of reclamation, and they cannot control the labor necessary for that purpose. Now, they ask that the only controllable labor we have there, which is under state authority, may be employed for that purpose. It is proposed that this draining shall be

effected by convict labor, that the state authorities shall undertake the work, and that only those shall pay for it whose lands are drained. To-day the rate of taxation in South Carolina is about seven mills, but the owners of land will willingly pay seven per cent. to have it drained; and therefore the people should have no objection to have their neighbors' land drained when they do not have to pay for it themselves. This being the condition of things, we trust that after earnest recommendation and agitation on this subject, the legislature will soon enter upon a plan of carrying out this momentous work.

Dr. PLUNKETT, of Tennessee.—In the absence of our secretary, I am only able to make a verbal and cursory report, as I knew nothing of the present call for reports, and was not prepared to make a report for our state. In the year 1877 the state of Tennessee, through its legislature, organized a state board of health. The state association had for several years previous to that time made application for it, but unsuccessfully. The board, as organized in 1877, was constituted of four members, one being the state geologist, one the state chemist, and two lay members, one representing the commercial interests, and the other the railroads. At present, seven members constitute the board, and out of their number they elect a secretary. For the first two years we had simply a nominal existence, having no special powers beyond that of an advisory body, and that somewhat limited; and no funds. In 1879, upon the impetus which the whole state received from the epidemic of yellow fever in the previous year, the legislature gave the board executive powers, possibly as extensive as they could be, and gave it an appropriation of \$3,000 a year for all expenses. That appropriation has been continued, and out of it we pay our secretary's salary and all other expenses. We hope that the next legislature will show sufficient progress in this work to warrant an increase of appropriation, believing, as we do, that our people are better informed than they were. We believe that the average citizen now takes in, in some manner, this subject of public health. The board has issued up to this time two reports, comprehending such material as existed, each report being about 600 pages of octavo form. I would state that if there is any organization represented in this Association that has not received those reports, and desires them, they will be furnished on application to the secretary. We have also commenced within the last two years the publication of monthly bulletins, in which we publish reports from each county health officer in the state, giving statements of the diseases prevalent during the month preceding the issue of the report. We also furnish a very full and exhaustive report of the ætiology of Tennessee. We have no vital statistics law: we had one at one time, but no compensation was allowed for the collection of these statistics, and two years ago the legislature repealed it. We hope to see the law reenacted in some shape; for, while we have no statistics to offer to the country at large, we are still fully alive to their importance. Some of the municipalities in our state have registration laws, and, I think, carry them out faithfully, among them being Memphis, Chattanooga, Nashville, and



other places. We usually issue circulars on the treatment of zymotic diseases—small-pox, yellow fever, cholera, diphtheria, etc. Two years ago the last legislature made a very decided advance in the organization of the health service of Tennessee by enacting a law creating county boards of health. We have ninety-six counties in the state, and up to this time eighty-two counties have organized. The law provides that county boards shall consist of the jail physician, together with the county judge and the county court clerk, the jail physician being president of the board. His salary is fixed by law, but in some of the counties the people were slow to provide adequate remuneration; yet we hope that as time rolls on they will appreciate the importance of the matter, and furnish the sinews of war. I do not know that there are any other points that I can mention of special interest to the Association. I have not been present at the meetings for the last three or four years, but I assume that the Association has been informed from time to time as to what we were doing.

Dr. W. D. DANIELS, of Wisconsin.—I regret, sir, that our executive officer, the secretary of our board of health, is not here to tell you more distinctly than I can in regard to the position of things in our state in a sanitary point of view. I may say, however, that while we are making no rapid progress, still from year to year we can distinctly recognize that we are making some progress in the work of sanitation throughout the state. We have the same trouble there that you have all experienced in your several localities, that of educating the people to the point of desiring, or even of accepting, the work of sanitary boards. We are accomplishing that work slowly, but perhaps as rapidly as we could expect any people to accept changes in their modes and methods of life. The thing which marks the most rapid progress that we have made is that our last legislature, in 1885, gave us a law requiring the establishment of boards of health in every township and municipal organization in the state. We have found this law to be very beneficial, as we have established direct communication with about 1,000 local boards of health. These boards have ample mandatory powers requiring them to have health officers, the power of abating nuisances, the power of quarantining, and all the other powers which are required by local boards. We have found those boards eminently successful, and their success is testified by the manner in which they were able to cope with some three or four cases of small-pox which were introduced into our state by its northern borders. We have been able to quarantine them, and to entirely prevent the spread of the disease, so far as it possibly could be done. There is one point on which I think we shall soon need the services of all our sanitarians, and that is in regard to water-supply. We have throughout our state a large number of very beautiful lakes, and there are on the borders of those lakes a large number of flourishing villages and towns. The natural thing for those villages and towns to do is to deposit their sewage in those lakes; and it is one of those things which it is very difficult to get a Western town council to understand, that that

is not just as well as to deposit it anywhere else. They do not realize that the fruits of this system will come upon their children in an evil day; and any discussion which shall tend to educate the people of the West, and I presume the people of the whole country, to the necessity of preserving their water-supply pure and uncontaminated, even if it does involve a slightly greater expense than their present system of dealing with their sewage, will be of great benefit to our state at any rate.

Dr. OLDRIGHT, Province of Ontario.—The chairman of our board has requested me to say a few words explanatory of what we have been doing in this province during the past year. I may say, in the first place, that one thing we have done is to establish a vaccine farm. We have always been ready enough to buy, beg, or borrow of you; and in this case I have no hesitation in saying that if you could show us any reason why you can make a better vaccine than we can here we should be sorry to have a vaccine farm established in this country. We have, however, a good agricultural country and a good climate, and we thought we should be ashamed of ourselves to be sending to more southerly climes for our vaccine when we could just as well get it here. I may say that the farm has been established under private management, but the government has very liberally assisted it with a grant of money; and in recognition of that grant, or, rather, as a condition of that grant, our board has been required to send an inspector from time to time to inspect the farm, and see that the vaccine matter and the animals from which it is taken are all right. Another project we have had on hand—and we have taken advantage of this meeting of the American Public Health Association to forward our object—is the formation of an association of officers of local boards of health. We think that by having a voluntary association of that kind, in which gentlemen engaged in the work might meet on similar lines to those of this Association and the convention of state boards of health, we might be able to mutually inform ourselves about local health matters, and compare notes with one another, and thereby do a great deal of good. With respect to the question of public nuisances, we have had our share of them, but we have to report very gratifying success in dealing with them. I will only take up one class of nuisances, and that is those connected with cheese factories. We have a large number of cheese factories in this province, and the whey and other refuse from them have in past times constituted a serious nuisance. But this year we have secured the coöperation of the Dairymen's Association, or they have secured ours, for both seem to be anxious in the matter, and they say that it is going to injure them commercially to have nuisances about their places, which would cause a deterioration in the quality of their cheese. They have therefore joined with us, and legislation has been introduced for the purpose of making our dairies and cheese factories what they ought to be in this respect. We have also had legislation in other directions: and in connection with the small-pox I think we may say that we have now got pretty nearly everything we want; and that is saying a good deal for a board of health, some people would

say. The local boards of health have given us every assistance in stamping out the disease. They have been of assistance to us in other ways, because when people see the good effects of sanitation in stamping out epidemic diseases, they think it must be a good thing in other respects.

Another point which we have gained this last year is the power to appropriate a hospital for cases of epidemic disease. If an epidemic breaks out in a village or town, the council now has the power to take possession of a building as a hospital. Of course they must exercise prudence and judgment; but they can take possession of a suitable building, and use it as a small-pox hospital by giving reasonable compensation to the owner. We have also had legislation passed which gives the board a supervising power over municipalities in the establishment of cemeteries, and we have thus been able to prevent the fouling of some of the water-supplies of the province. Speaking of legislation, I may just say that our board is endeavoring to follow this line; that, although we have a certain amount of mandatory power, we have tried not to run too far ahead of the people. We find that if you do run too far ahead, they begin to kick; but if you go just a little bit ahead of them, they are inclined to follow you, and you are better able to accomplish your object. We should like to see some provision by which in certain localities local boards should have money granted to them to carry out particular sanitary objects. Some councils do not feel disposed to grant money for sanitary purposes, and when we got our act put through we put in the word "shall"—that they shall provide the money. The government thought that was going a little too fast, and they put in the word "may." Now it is our effort to have the word "may" struck out, and have the word "shall" substituted. With regard to text-books, I may say that during the past year we have also got out a text-book on hygiene, and I am sorry that I did not think of it, and bring a copy down to present to the Association. I believe, however, that a number have been sent to the members, so that they might have an opportunity of seeing them. The Minister of Education is seconding our efforts in every way by obliging the subject of hygiene to be taught in the higher schools under the control of the department. I wish, before concluding, to say something about local boards of health. A local board of health is established in every locality. The act requires that the municipalities, be they cities, towns, or townships, shall establish local boards of health; but we find that in some cases they were a little slack about it, and it was necessary that we should have power, for example, in case of the breaking out of an epidemic disease, to establish such a board. When we find that a particular locality is in a bad sanitary condition, and that the council is not alive to the matter, we have the power of communicating with them, and saying, We want you to establish a local board within a certain number of days;—and if they do not do so, we have the power of establishing such a board. We have also an extra advantage in this way, because we can then nominate the most suitable men to constitute the board. These,



Mr. President, are the principal points in connection with our work during the past year.

Mr. F. N. BOXER, of Province of Quebec.—Dr. Hingston, the chairman of the Central Board of Health of our province, and a member of this Association, has requested me to express his regret that, having just returned from a tour on the continent, he has been deprived by the pressure of professional duties from taking a part in the transactions of this meeting. He therefore deputed me, as the secretary of the board, to be its representative, and I have also the honor of being an official representative of the government of the province. Previous to the recent outbreak of small-pox in Montreal in the spring of 1885, there existed no health organizations in the towns and villages of the province. Each municipality had power, by the laws of the province, to elect a local board of health, and to make such by-laws as it considered necessary, to protect its inhabitants from contagious and infectious diseases. This, however, had never been done. Consequently, when the disease broke out in Montreal, and spread with such rapidity to towns and villages along the line of railroad and steamboat communication, and more particularly into the suburban and contiguous villages, where it raged with great virulence, there being no health organization, and no medical officers having any legal power to adopt and enforce measures to arrest the progress of the disease; and the epidemic, moreover, having increased to such an extent in the month of September last year as to render it utterly impossible for the authorities of the city board of health of Montreal to control it without assistance from a higher power, the government of the province was invoked to put in force an old health act, under which it could, in case of an epidemic, appoint a Central Board of Health. This board was at once appointed, and immediately set to work to draw up by-laws, rules, and regulations, which, after having been submitted to and approved by the lieutenant-governor in council, were proclaimed the law of the province. It is unnecessary for me to take up the time of this meeting by relating anything further in connection with this outbreak of small-pox in Montreal, in which not a case now exists. Its history has already been made too familiar to you through the reports of the press, which too often were greatly exaggerated. It is a history which we all know of now, too much to our cost; and from it we can learn the lesson of how necessary it is that every country should be educated as to its sanitary duties, and as to its moral obligations towards its neighbors in connection therewith. Immediately after the appointment of the Central Board of Health every municipality was called upon to form a board of health and appoint a medical health officer; and it was requested to conform to the by-laws, etc., of the Central Board. At first, many of the municipalities were opposed to obeying the instructions and laws sent to them. These laws were entirely new to them: they were of course tentative, and apparently, though not necessarily, involved an expenditure of municipal funds, the extent of which they could not foresee, and which, in a municipality where the disease had not broken out, appeared un-

necessary and harsh. I have now much pleasure in stating, however, that out of a great calamity has been born a child of health, which, it is to be hoped, will grow in strength and power. The provincial government of Quebec, seeing how important it was that the province should never again be left without a legal health organization, passed an act for the formation of a permanent provincial board of health. Although this act does not contain all the provisions which the medical profession and sanitarians consider necessary to secure perfect protection to the public health, the province of Quebec is not singular in that respect. I learn that the same difficulties have been felt by some of the states of the Union, as well as by our sister province of Ontario, in obtaining in the first year of their existence that perfection in health laws which from their experience they knew was essential, but which legislators could not, at the outset and with less sanitary knowledge, deem so necessary. It affords me great pleasure to be able to state that the feeling of irritation against the execution of the health laws of the central board which was felt at first has almost totally disappeared, and has been succeeded by feelings of quite another character. I have in my record several letters from chairmen of local boards of health, and from the curés of parishes approving of the wisdom, necessity, and justness of those laws; and I may say also that the health organizations will now have in their favor the highest clerical influence in the province of Quebec, and the approbation of every right-thinking man. The first feeling of irritation arose, I may say, more from ignorance as to the extent of the danger than from apathy towards the enforcement of judicious health laws; and all opposition gave way when the people began to understand that the central board of health executed its laws with discretion, judgment, and humanity. In the name of the Central Board of Health and of the citizens of Montreal, I desire to express to you, gentlemen, the high feeling of admiration and esteem we felt for the courtesy shown by the medical officers of the Union and of the province of Ontario in the performance of the arduous and delicate duties which were forced upon them for the protection of their respective countries. [Applause.]

Dr. MONTIZAMBERT, of Dominion of Canada, Quarantine Delegate.—When I had the honor of addressing this Association at Washington, I was able to inform you that the government of Canada had ordered the construction and equipment of an inspecting and disinfecting steam yacht for the quarantine service at Crosse Isle in the St. Lawrence. I am now enabled to inform you that the steam yacht was completed last spring, and took up her position at the station on the 2d of June last. She is fitted with the mercuric chloride drench, for the wetting by means of hose of the inside of hospital cabins, decks, fittings, etc., that cannot so well be reached in any other way. She has also superheating coils and steam hose for disinfecting with superheated steam. In the hospital cabin, for landing sick, I have repeatedly by this means, within three minutes and a half, brought the temperature up to 110 degrees centigrade, or 230 Fahrenheit, a temperature that will destroy with absolute

certainly the micro-organisms that cause disease, and even the most refractory spores. These two methods—the mercuric chloride drench and the superheated steam—are used for the rapid disinfection of ship's hospitals. She is also fitted with the furnaces, exhaust fan worked by a donkey engine, asbestos hose, etc., which you are familiar with as forming the apparatus for the sulphur dioxide blast, for knowledge of which we have to thank Dr. Joseph Holt, of New Orleans, ever to the forefront of advance in maritime sanitation. This sulphur dioxide blast is used for the disinfection of larger cabins, steerages, and holds of vessels. Owing to the prevalence of cholera, and also of small-pox, in Europe and Great Britain, the Dominion of Canada issued on the 3d of August supplementary regulations for quarantine. As these have been referred to several times during this session, I will ask to be allowed to lay before this Association a copy of them, and also a copy of the questions to be answered under oath by quarantine officers, by masters, surgeons, or officers of vessels. I may say briefly that these supplementary regulations embody four great principles: first, the examination by medical officers responsible to the government of every vessel arriving by the St. Lawrence from any port outside of Canada; second, the taking of the evidence of ships' officers under oath, a form of affidavit being attached to the form of question; third, an effort is made by differential regulation to induce vessels to provide properly isolated and ventilated hospitals. Questions on this point are to be asked in each case, and the difference of treatment will be apparent from the following extract from the regulations:

"Every steamship or sailing vessel arriving with infectious disease shall be liable to be detained at the quarantine station for disinfection, together with its cargo and passengers and crew; but every steamship or vessel provided with one isolated hospital for men and another for women, on the upper deck, ventilated from above and not by the door only, may, in the discretion of the quarantine medical officer, if he is furnished with satisfactory evidence that such hospitals have been promptly and intelligently made use of, be allowed to proceed after the landing of the ship and the disinfection of such hospital; any vessels, however, arriving with infectious disease, without having such special and ventilated hospitals, shall be liable to be detained for disinfection at the quarantine station."

It is confidently expected that this will induce vessels to provide themselves with suitable hospitals. The fourth principle is, that the examination as to vaccinal protection of all on board, within a seven years limit, is required. In this connection I would wish to say a few words as to the requirements of vaccinal protection for cabin passengers. There is now a resolution before the advisory council, as you are aware, referred to it from this Association, recommending uniformity of usage at all ports on this important matter. It is now required in Canada, but not under ordinary circumstances at New York, Boston, or Portland, where it is only enforced if small-pox has occurred on the voyage. It is very



evident that Canada cannot stand alone in this matter. It is all very well to say, as some one said yesterday, that Canada should continue to do what is right in the matter, whatever is done elsewhere; and doubtless Canada would do so were the object of the protection of the health of her people to be thus gained. But it is obvious that as Canada is not an island, or surrounded by maritime quarantines, she cannot stand alone in this matter. If she orders vaccination, and Portland, Boston, and New York will not, the effect will simply be to divert Canadian first-class ocean passengers into Canada *via* one of these ports, instead of *via* the St. Lawrence. They will still come unprotected into our country, the only difference being that they will enter Canada a few hours later, so that our steamship lines would be injured without any gain to the public health. A good deal has been said and many dreadful descriptions given of delicate ladies having to bare their arms on a vessel's deck, and having to submit to vaccination by a ship's surgeon or a quarantine official they never saw before, and of whose lymph-supply they know nothing. Well, it seems to me that these scenes are rendered likely by the system at the ports I have named, where, if no sickness occurs, no questions are asked of cabin passengers, but where, if a case of small-pox happens to break out on the ship, all the cabin passengers find themselves unexpectedly confronted with vaccination. If the United States ports would only act with Canada in this matter, these distressing scenes would never occur. Once it were known that all passengers arriving on this side must have evidence of recent vaccination, people about to cross the Atlantic would quietly send for their family physicians and be vaccinated, if necessary, and provide themselves with certificates; and this would be as regularly done as providing themselves with steamship tickets, or with passports where such are required, and they would thus be free from annoyance even if small-pox occurred on their vessel. The ship's surgeon would be required to assure himself that all the cabin passengers held proper certificates, and to make a statement to that effect under oath on arrival at the quarantine station. I am quite aware that the Ontario officials and those of the United States Marine Hospital staff had to refuse to look at certificates during the recent inland quarantine for the Montreal epidemic. But that was very different. Hundreds and even thousands were passing daily, and identification was impossible. But on an ocean voyage it is very easy for the surgeon to inspect the certificates of people whose names are inscribed in the passenger list. I take it that amongst the class of people who travel as cabin passengers on our ocean steamships, it is at least improbable that any one would cross the Atlantic under a false name, to avoid vaccination by using some one else's certificate. [Applause.]

The PRESIDENT.—I have the pleasure of announcing that Dr. Russell, of Glasgow, Scotland, has kindly consented to address us this evening; also, that the committee on the award of the Lomb prizes will report this evening. I would also call the attention of the members of the Executive Committee to the fact that a meeting is called for five o'clock this

afternoon. I would further intimate that the Advisory Council meets in the adjoining room. The next order of business is the reading of a paper on "Recent Progress in the Investigation of Hog Cholera," by D. E. Salmon, D. V. M., Washington, D. C. (See page 38.)

The PRESIDENT.—The next order is the Report of the Committee on Disinfectants, by Dr. Sternberg.

Dr. STERNBERG.—As chairman of the Committee on Disinfectants, I am sorry that I am obliged to commence my report by saying that no experimental work has been done by this committee during the past year. On returning from Europe last year, after the meeting of the Association, as there were no funds at the disposal of the committee at that time I did not feel justified in calling the committee together, and circumstances were such that I was not able to commence any experimental work myself. I had other work on hand. Later, the bill for the appointment of the yellow fever commission seemed likely to become law; and as there seemed to be a general expectation that I should go on that commission, I occupied myself in special preparations for that work, and was thereby prevented from attending to any work in connection with disinfectants. To undertake such work properly, one must go at it deliberately and with the expectation of continuing at it for some time, and, moreover, a certain amount of money is absolutely necessary. I was unable to employ an assistant this year, as I did last. I might have started an assistant, but no money was on hand until I received notice in March or April that certain funds were at the disposal of the committee, and I was then unable to avail myself of them. Last year the question of the practicability of disinfecting sewers was referred to the committee, but for reasons which I have given I have been unable to undertake this investigation. I have conferred with one or two members of the committee as to whether any practical means could be adopted of testing this question, but we could not see how we could undertake it without having a certain sum of money at our disposal, and it would be necessary to go to a city where the sewers were favorable for such an investigation, and spend some time and have a good deal of study before attempting to make a report which would be of any value. At my request, Dr. Rohé, secretary of the committee, has prepared a careful report on disinfection by moist heat and more especially by steam,—a report which I consider an extremely valuable one, especially for reference, as it includes diagrams showing the most approved forms of apparatus for disinfection by steam. At my request, also, Dr. Durgin of Boston and Dr. Holt of Louisiana will make statements here with reference to methods of disinfection now practised at those sea-board cities; and those gentlemen have permission subsequently to write out the statements they may make, and have them included in this report which we will present to-day.

Dr. Hunt moved resolutions respecting the diseases of hogs.

On motion, the resolutions were referred to the Executive Committee.

Dr. Gihon moved the adjournment of the meeting.

The motion having been seconded, was put to the meeting, and carried on the following division: Yeas, 17; nays, 16.

The meeting accordingly adjourned until 8 o'clock P. M.

*EVENING SESSION—8 O'CLOCK.*

The hour of 8 o'clock having arrived, the President called the meeting to order.

THE PRESIDENT.—The proceedings of this evening will be opened with prayer by the Rev. Mr. Stafford.

Prayer having been offered by the Rev. Mr. Stafford,—

THE PRESIDENT.—The first business in order is the reading of the report of the Committee on the Lomb Prize Essay.

Dr. Gihon read the first report. (See page 327.)

Dr. Conn read the second report. (See page 327.)

Dr. Hewitt read the third report. (See page 328.)

The reports of the committee were accepted, and ordered to be placed on the files.

THE PRESIDENT.—The next business in order is the reading of a paper on "Decomposition of Albuminoid Substances, and Some Sanitary Problems connected therewith," by Peter H. Bryce, M. A., M. D., secretary of the Provincial Board of Health of Ontario. (See page 133.)

Dr. GIHON.—I move that the suggestions of the paper be referred to the Committee on Animal Diseases.

The motion having been seconded, it was put to the meeting and carried.

THE PRESIDENT.—The next order of business is the reading of a paper on "Sanitation in Street Paving," by George Baird, M. D., of Wheeling, W. Virginia. In the absence of Dr. Baird, the paper will be read by Dr. James E. Reeves. (See page 142.)

Dr. JAMES E. REEVES.—I should simply remark, in addition to what has been written by Dr. Baird, that we have about three miles of this brick pavement. From Chaplain street, where there is the greatest continuous length, it is on the line of travel and traffic of the largest manufacturing establishments of the city—large iron and nail mills; and the heaviest loads which can be drawn on wagons have passed for three years over this pavement, and I am sure, as the writer has said, that during the three years of its use not a dollar has been expended in repairs. Every rain washes it so that the surface is as bright and clean as that of our sidewalks. It has everything to recommend it as a pavement; and as I enjoyed our magnificent drive this afternoon, and as I passed down your boulevards, I could not help exclaiming, in the language of the women, "Oh, my! Oh, my! If these people only had our brick paving!" The preparation for laying is very simple, and its cheapness you will have some idea of when I say that our brick pavement, including grading, has been let at \$1.40 per square yard. [Applause.]



The PRESIDENT.—Ladies and Gentlemen, I have very great pleasure in presenting to you Dr. Russell, of Glasgow. [Applause.]

Dr. Russell, who was very warmly received, addressed the meeting. (See page 33.)

The PRESIDENT.—The next order of business is the reading of a paper on "Food in its Relation to the Distribution of Wealth," by Mr. A. Blue, secretary of the Bureau of Industries, Ontario. (See page 145.)

The PRESIDENT.—Col. Hadden, of New Orleans, wishes to have a few minutes of your time to make an announcement.

Col. HADDEN.—I do not know whether the action of the Advisory Committee on the place of the next meeting of this Association has been reported. I desire, however, before I shall be called away by business in the morning, to extend to this Association an invitation to hold its next meeting in our city of Memphis. It has been some years since it has met in that city, at least it never has met there during the time that I have been at the head of the city government. A great deal has been heard about Memphis in all these various associations, such as this body, the sanitary council of the Mississippi valley, the national board of health, and other organizations of that kind, so that you are pretty well acquainted with the fact that we keep up with all these health associations. In fact, I believe that the president of our board, Dr. Thornton, and myself have attended all your meetings. We have got acquainted with nearly all of you, we feel personally interested in each one of you, and for that reason the city of Memphis extends to this Association an invitation to hold its next meeting there. I may say, that if it is convenient to the Association, the time that would be best adapted to our climate for the purpose of such a meeting would be probably the second week in November; and if you should decide to select Memphis as your place of meeting, I should prefer your holding it in that month, because the climate about that time would render your stay more pleasant than it would be later. I can promise you this, that we will do our best to entertain you in a hospitable manner, and at the same time we will feel that if you decide to convene there you will confer a very great honor on our city. We can promise you another thing: we will show you a city redeemed, as it were, from disease and death. Its redemption we attribute in a great measure to the vim and pluck of our own people, assisted by the advice and aid that the health bodies throughout this country have extended to us. I do not think Dr. Thornton is here this evening, as he is somewhat indisposed; so I cannot say whether he has in person extended to you this invitation. Very likely he has; but, knowing that I should be called away in the morning, I stayed over night to extend to you a cordial invitation to have your next meeting at the city of Memphis. I hope, gentlemen, if there are other cities desiring this honor, that for this once they will waive their claims in our favor. As I have stated to some of your members in private, I came here purposely to invite you there,—not that I could aid this Association in any way by attending their meetings. I am not much of a sanitarian, I am

not a physician, but I have come to ask you to dwell with us for a while, and to see the benefits that we have derived by following the advice of sanitarians throughout this country. I believe, Mr. President, that I have nothing further to say; but if I should be absent at the time the vote is taken, I shall regard it as a great favor if you will use your influence to have the Association vote in favor of Memphis. [Laughter and applause.]

The PRESIDENT.—The next order of business is a paper on “The Best Methods and Apparatus Necessary for the Teaching of Hygiene in the Public Schools, as well as the Means for Securing Uniformity in such Instruction,” by H. P. Yeomans, A. B., M. D., member Provincial Board of Health of Ontario. In the absence of Dr. Yeomans, Dr. C. W. Covernton has kindly consented to read portions of the paper. (See page 99.)

The PRESIDENT.—Next in order is the report of the Committee on the Disposal of the Dead.

Dr. HIBBERD.—The chairman of that committee is not present, owing to indisposition, and is not likely to be present. I therefore suggest that it be read by its title, and referred to the Committee on Publication.

This suggestion was embodied in a motion, which was carried. (See page 328.)

On motion, the Association then adjourned until Friday, October 8.

#### FOURTH DAY.

FRIDAY, October 8, 1886.

##### MORNING SESSION.—10 O'CLOCK.

At 10 o'clock A. M. the Association was called to order by the President.

The PRESIDENT.—The Association will be opened with prayer by the Rev. Septimus Jones.

Prayer having been offered by the Rev. Mr. Jones,—

The PRESIDENT.—As there appear to be no further announcements to be made by the local Committee of Arrangements, I will call the next order of business, which is the election of members.

The SECRETARY.—The Executive Committee recommend the following names for membership. (Names in list.)

On motion, the Secretary cast the ballot of the Association for the names as read; and the persons whose names had been read were admitted as members of the Association.

The SECRETARY.—The Executive Committee have considered the resolution on the disinfection of rags, which was referred to the committee, and they recommend that the word “uniform” before the word “systems” in the resolution be struck out. Also that the following be added to the resolution: “If it proves to be impracticable to disinfect

them, it is recommended the disinfection may be commenced in quarantine sufficient to insure safety in transportation, to be completed in the manufacturing establishment by such methods as the health authorities may prescribe;" so that the resolution as amended will read as follows:

*Whereas*, It is an admitted fact that the importation of rags is a prolific source of the spread of infectious disease, and that the seaboard cities which are ports of entry are the gateways through which this infection enters and is distributed throughout various sections of the country; and,

*Whereas*, There are grave doubts as to the efficacy of the methods of disinfection used abroad;—therefore,

*Resolved*, That it is the judgment of the American Public Health Association that all health authorities having jurisdiction over matters connected with maritime sanitation owe it as a duty to the general public to adopt such systems of disinfection as will thoroughly destroy all disease-bearing germs before the rags are permitted to be distributed for manufacturing purposes. If it proves to be impracticable to disinfect them, it is recommended the disinfection may be commenced in quarantine sufficient to insure safety in transportation, to be completed in the manufacturing establishment by such methods as the health authorities may prescribe.

The SECRETARY.—On the resolution offered by Dr. Vaughan, that the report be printed in pamphlet form, the committee report that it is inexpedient to recommend it owing to the limited financial resources of the Association. I would say that the report will be printed very soon, as the forthcoming volume of the transactions of the Association will be immediately put to press, so that we hope that it will be distributed in a very few months at most.

On motion, the recommendation of the committee was adopted.

The SECRETARY.—The resolution offered by Dr. Hunt is recommended by the committee for adoption.

*Resolved*, That the American Public Health Association regards as of the highest importance the investigations being made by the Agricultural Department at Washington, through its Bureau of Animal Industry, into the Etiology of Swine Plague and allied diseases, both in its bearing on animal diseases and on diseases affecting mankind, and that we ask that facilities and appropriations for their continuance be still more extended.

On motion, the recommendation of the committee was adopted.

The SECRETARY.—The Executive Committee have considered the resolution relative to the pollution of water-supply offered by Dr. Playter; also the amendment offered by Dr. Gihon, and beg leave to report as a substitute the following:

*Resolved*, That a Committee on the Pollution of Water-Supply, consisting of five members, be appointed by the President.

On motion, the recommendation of the committee was adopted.

The SECRETARY.—The Executive Committee recommend to the Association the discontinuance of the committees on School Hygiene, Disposal of the Dead, and Antiseptics in Vaccination. Adopted.

The Executive Committee recommend that committees on State Boards of Health, on Animal Diseases and Animal Foods, on Disin-



fectants, on Incorporation, and on Forms for Mortality Reports be continued.

On motion, the recommendations of the Executive Committee were adopted.

Dr. BAKER.—I would move that the Executive Committee be recommended to publish the report of the Committee on Disinfection of Rags in pamphlet form, if practicable.

The PRESIDENT.—Why not give the Publication Committee power?

Dr. BAKER.—I have no objection; and I move that the committee be recommended to publish it in separate form, if practicable.

On motion, the recommendations of the committee were adopted.

Dr. REEVES.—Is it in order for the Advisory Council to make their report?

The PRESIDENT.—Certainly.

Dr. REEVES.—Then I will move that the Advisory Council report its proceedings.

The motion having been seconded, it was put to the meeting and carried.

Dr. MONTIZAMBERT then presented the report of the Advisory Council.

On motion, the recommendation of the Advisory Council was adopted. (See page 324.)

Dr. MONTIZAMBERT.—The Advisory Council beg leave to report back the following resolution relating to the action of the Louisiana State Board of Health at Biloxi, Miss., with the recommendation that it be adopted. (See page 324.)

On motion, the recommendation of the Advisory Council was adopted.

Dr. MONTIZAMBERT.—The Advisory Council beg leave to report the following resolutions. (See page 325.)

Dr. JENNER.—I think that this resolution is one which will be found impracticable, and I certainly protest against its passing. I hope the Association will not adopt it.

Dr. HIBBERD.—It is simply a recommendation which we can pass without detriment to anything.

Dr. JENNER.—I do not think this Association can afford to give impracticable advice.

Dr. MONTIZAMBERT.—I do not understand what gentlemen mean by this resolution being impracticable. When the government adopted this regulation, they did not at all contemplate the state of affairs which has been suggested several times. Gentlemen say, Do you really expect that ladies coming out as cabin passengers are going to allow themselves to be passed under a rope, like so many steers, and to have their arms examined to see if they have been vaccinated? No, you cannot. Do you expect that ladies coming from a pleasure trip to Europe are going to submit themselves for vaccination by ships' surgeons, young men just from the medical schools, in whom they have no confidence, and in whose vaccine lymph they have no confidence? Now, as I understand

it, government, in framing such a regulation, did not contemplate either of these proceedings. They do not expect that cabin passengers will have to submit themselves for vaccination by quarantine officials or by ships' surgeons. If you think for a moment what the practical effect would be were this system uniform all along the seaboard, you will see at once that if it were well known that on returning to America cabin passengers would not be allowed to enter in unless they could give reasonable proof of vaccination, the result would be that when people were starting from this side on such a trip they would apply to their private physicians at their own homes, and get a certificate of vaccination with the same regularity as they would buy a ticket from the steamship company, or a passport, if a passport were necessary. I said this to one gentleman here, and I was met with the observation that it had been found, both in connection with the inland quarantine officers along the line between Quebec and Ontario during the recent epidemic, and also by the officers of the United States Marine Hospital Service, that no confidence could be placed in these written certificates. That is eminently true, but there is a great difference between the two classes of cases. In the case of railway travel, thousands are passing from one side to the other daily and hourly almost, and it is utterly impossible to identify many of these persons. There would be nothing to prevent a person going in and using a certificate to-day, and then, when he arrived at his destination, mailing it back to another person, and so on. For these obvious reasons certificates of this kind were very properly refused. But in the case of a steamship it is very different. They have a register of the names of their passengers; they are out for a period of ten days or so; and there is no doubt that a properly signed certificate in the hands of persons such as usually travel as first-class passengers on our steamship lines could be taken with perfect safety. The ship's officer would only require to see that passengers had such certificates, and to make oath that they were all so provided.

Dr. JENNER.—In the event of producing a certificate of vaccination having been performed seven years before, would it be necessary, according to the resolution, to undergo the operation again?

Dr. MONTIZAMBERT.—If it were longer than seven years it would be required, seven years being the limit. That is the law in Canada at the present time.

Dr. JENNER.—I think it will be found impracticable to enforce this regulation, and, besides, in my opinion, if vaccination is thoroughly performed, it is performed once and forever. I think that a certificate of vaccination having been thoroughly performed should be sufficient.

Dr. LEE.—It has been stated that certificates given by respectable physicians are utterly worthless; and the statement is one which casts a stigma on the whole medical profession. For my own part, I would not give a certificate to a person whom I did not consider protected by vaccination, and I do not believe that there is a physician on this floor who would give such a certificate, nor a physician connected with any of our

medical associations who would do so. And if that be true, how can such certificates be treated as valueless? There is no person who travels to Europe but who has to go to a considerable amount of trouble to get passports; and certainly those who go through so much trouble and some expense to get passports would be willing to go through the slight trouble and expense which would be required to comply with these regulations.

The PRESIDENT.—The discussion will be limited to five minutes for each speaker, no person to speak a second time until every one else who desires to speak has spoken, and then only by consent.

Dr. PLUNKET.—It seems to me that the whole proposition before the Association is narrowed down to this: Should the Association express an opinion on the advisability of this system of inspection and vaccination? I think it is entirely competent for the Association to express such opinion; and it seems to me that some of the details which have been brought up in the discussion are somewhat foreign to the proposition before us. Our friends in Canada have adopted a certain plan of attaining the end in view, and I think we cannot gainsay that such an end is advisable without entering into all the details. Each board can have its own method of gaining the end, but I think we should all agree about the end to be attained.

Dr. BELL.—I believe this Association can afford to say anything it believes about matters which are in conflict with the public health. I can call to mind more than one case of small-pox being introduced by cabin passengers, and I recall at least one distinguished person who arrived in New York two years ago with the premonitory symptoms of small-pox, and was permitted to pass. I think the adoption of the resolution would of itself invite that voluntary compliance with its intention on the part of the cabin passengers which we require, by reason of their general intelligence as compared with that of the steerage passengers. I know from practical experience that it is only the most ignorant classes of passengers, such as we do not generally find in the cabin, who are unwilling to submit to all necessary measures for the protection of the public health. I hope, therefore, the resolution will pass, simply as an admonition, which will rarely if ever require to be exercised officially in a way which would be repugnant to the most delicate of passengers coming in on our steamships.

On motion, the recommendation of the committee was adopted.

Dr. MONTIZAMBERT.—The Advisory Council recommend the following list of officers for the ensuing year. (See page 325.)

On motion, the recommendations of the council were adopted.

The PRESIDENT.—I promised you, when one year ago at Washington you elected me unexpectedly to this most honorable office, that I would do the best I could to maintain its dignity, and that at the end of the year I would turn it over to a better and abler successor, and you have made it very easy for me to do so. I now present to you your president-elect, Dr. George M. Sternberg, Major United States Army.



Dr. STERNBERG.—Gentlemen, I thank you for the honor you have done me. I appreciate it very highly, but I must protest against the statement of our ex-president that he has turned over the office to a more worthy successor. I feel that without the support of our ex-president, and of those who have gone before me, I would be quite inadequate to assume the responsibilities of this high office. But fortunately I shall have with me upon the executive committee, to assist me by their counsel and experience, our ex-president and others who have preceded me, and I trust that altogether we may succeed in making of the Memphis meeting—and I beg you all to join with us in this undertaking—a meeting which will be memorable in the annals of this Association. Gentlemen, again I thank you for the honor you have done me. [Applause.]

Dr. GIHON.—Is it allowable, Mr. President, to tell any of the secrets of the Advisory Council?

The PRESIDENT.—I do n't think it is, especially as Dr. Gihon has not taken the precaution of informing the President what the secrets are. [Laughter.]

The PRESIDENT.—The next business in order is a paper on the Abuse of Alcohol, by Prof. Stanford E. Chaillé. This paper will be read by title. (See page 51.)

The SECRETARY.—The following is the report of the Auditing Committee. (See page 340.)

The PRESIDENT.—The report will be received and placed on file.

Dr. BAKER.—Some time ago we had a Committee on Vital Statistics.

The PRESIDENT.—A committee has been constituted on that subject, but not appointed.

Dr. BAKER.—I only wanted to move that of that committee Dr. Billings be the chairman.

Dr. D. E. Salmon, D. V. M., read the report of the Committee on Animal Diseases and Animal Food. (See page 332.)

Dr. SALMON.—I desire to say that this report has been very hurriedly written, and I wish the privilege of amending it somewhat and changing the phraseology before submitting it to the Publication Committee at a later day.

The PRESIDENT.—That will be understood. The report will be received and placed on file.

Dr. REEVE.—Did I understand Dr. Salmon to say that the flesh of a cow suffering from pleuro-pneumonia was not injurious to human life?

Dr. SALMON.—No, I said the virus of the disease did not affect the human species. There is a great temptation for owners of cattle suffering from this disease to place them on the market when they are affected. The animals are slaughtered even in the first stages of the disease, and when, although such food may not produce specific disease, it is certainly not healthful. They are also slaughtered in the latter part of the disease when a portion of the lungs is broken down with pus, and when frequently there is a considerable amount of septicemia, in which case blood poisoning might result to those who consumed such meat. There-

fore we consider it dangerous for the meat of animals affected with the disease to be placed on the market, and decidedly opposed to the tendencies and the ideas of propriety of our people.

The SECRETARY.—I have here another application for membership, which has come in rather late, that of Dr. W. T. O'Reilly, Inspector of Asylums for the Province of Ontario. The application has been submitted to individual members of the committee, who recommend Dr. O'Reilly's election.

On motion, Dr. O'Reilly was declared a member of the Association.

The PRESIDENT.—Dr. Bryce wishes to make an announcement.

Dr. BRYCE.—I wish to say, Mr. President and gentlemen, that the certificates for return fares at reduced rates will be signed at the office in the back part of the room. I have also to intimate, as the completion of the entertainment of the Association, that Alderman Walker, Chairman of the Committee on Water-Works of this city, has kindly offered to entertain all the members of the Association who are staying over, and who may find it possible to attend, to a sail round the bay and into the lake over the course of the intake of the water-supply, as also round the point where the proposed outfall of the new sewer is. Gentlemen who may wish to take the sail will please be at the foot of Lorne street, exactly in front of the Queen's Hotel, this afternoon at 3 o'clock, and they will take passage on the steamer Vivid. Ladies, of course, are also expected to go. The trip, I believe, will take about an hour and a half. Dr. Oldright has just informed me that there are to be two steamers, so that those who may arrive too late for number one will be present for number two, that is if they are not too late for number two. [Laughter.]

The PRESIDENT.—Is there any other business before the Association?

Dr. ROHÉ.—I have a resolution which I would like to present. It does not require any reference to the Executive Committee. It is as follows: That the thanks of the American Public Health Association are hereby tendered to the ladies and gentlemen of Toronto for the hearty manner in which they have tendered their courtesies to the Association; to Dr. P. H. Bryce, Secretary of the Provincial Board of Health, the efficient chairman of the local Committee of Arrangements, and to that committee; to Dr. Charles W. Covernton, President of the Provincial Board of Health, the efficient chairman of the Reception Committee; to Dr. Theodore S. Covernton, the efficient chairman of the Transportation Committee, and all those associated with him; to the ladies' Reception Committee, and all those associated with them, for the manner in which they have tendered the courtesies of the city and of their houses to the members of this Association and their ladies; to the members of the Provincial Government for courtesies tendered to the Association; to the mayor and members of the city council, and especially their reception committee; to the medical officer of health and the local board of health, Toronto; to the water-works committee of the Toronto city council; to the Toronto club and the National club; to the proprietors of the hotels; to the Toronto press, and especially the *Toronto Mail* and *Globe*, for

the excellent reports which they have given of the meetings of this Association, and, I may add, Mr. President, to all others who have aided in any way to make our stay in this city so pleasant. I wish, however, to amend my motion by including the railroad companies among those to whom we tender our thanks.

Dr. VAUGHAN.—I would move to amend it by including the faculty and friends of the Toronto School of Medicine.

Dr. ROHÉ.—I am also reminded that I have forgotten the telegraph companies.

The PRESIDENT.—It is assumed that Dr. Rohé will include all.

Dr. ROHÉ.—You will notice that I have added an omnibus clause which includes everybody.

The motion, having been seconded and put to the meeting, was carried.

The PRESIDENT.—The announcement of the appointments to committees for the following year will now be made.

The President read the names of the members of the Advisory Council. (See page 348.)

Dr. BELL.—I move that the name of Dr. Otterson be added to the Committee on the Disposal of Garbage.

The motion having been seconded, was put to the meeting and carried.

Dr. GERRISH.—I move that the thanks of the Association be tendered to the retiring President for the satisfactory manner in which he has presided over our deliberations.

Dr. JENNER.—I second the motion.

The motion was put to the meeting and carried.

The PRESIDENT.—I thank you, gentlemen, most heartily, but you have made it a very easy task to preside over you. [Applause.]

On motion, the Association adjourned *sine die*.



## REPORTS OF COMMITTEES.

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PRESENTED AT THE FOURTEENTH ANNUAL MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION, TORONTO, ONT.,  
CANADA, OCTOBER 5-8, 1886.

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### REPORT OF THE ADVISORY COUNCIL.

The Advisory Council of this Association beg leave to report the following resolution, with the recommendation that it be passed :

#### “A”

WHEREAS, It is necessary for the protection and preservation of the public health that prompt information should be published of the existence of cholera, yellow fever, and small-pox,—

1. *Resolved*, That the American Public Health Association believes it to be the duty of each state and provincial board of health, within whose jurisdiction one of these diseases shall appear, to give immediate notice of the existence of the same to neighboring state and provincial boards of health and to the boards of towns and cities in neighboring states and provinces which have no central board. In such states and provinces this duty of notification lies upon the local boards.

2. *Resolved*, That it is the sense of this Association that whenever rumors of the existence of pestilential disease in a state or province prevail, and, upon proper application to the health authorities of said state or province, information respecting the truth of the rumors is refused, the health officials of another state or province are justified in entering the beforementioned state or province for the purpose of investigating and establishing the truth or falsity of such rumors. In conducting the investigation, every reasonable effort should be made to coöperate with the health authorities of the locality.

3. *Resolved*, That a case which so nearly resembles one of the specified diseases as to raise a reasonable suspicion of its character, or a case in which concealment is attempted, ought to be reported as a suspected case, in the same manner as if the diagnosis were certain.

They also beg leave to recommend for adoption the following resolution :

#### “B”

RESOLVED, That the American Public Health Association commends the wise precautionary measures taken by the State Board of Health of Louisiana, on the occasion of the recent outbreak of fever at Biloxi, Mississippi.

Also, they beg leave to recommend for adoption the resolution of Dr. Rauch :

## “C”

WHEREAS, It is apparent that there is a variety of usage at the different ports of arrival as to examination of cabin passengers with regard to their vaccinal protection—such protection being required within a seven years limit in the St. Lawrence, but not at all under ordinary circumstances, at United States ports; and

WHEREAS, It is expedient that uniformity of action prevail in this important matter all along the entire seaboard,—

*Resolved*, That it is the opinion of this Association that in all cases and at all ports the vaccinal protection of all passengers arriving from Europe—cabin passengers as well as others—is to be exacted, even if no case of small-pox has occurred on the voyage.

They beg further to report the following as the list of officers nominated for the ensuing year :

*President.*

Major GEORGE M. STERNBERG, Surg. U. S. A.

*First Vice-President.*

Prof. CHARLES N. HEWITT, Red Wing, Minnesota.

*Second Vice-President.*

Prof. CHARLES A. LINDSLEY, New Haven, Conn.

*Secretary.*

Dr. IRVING A. WATSON, Concord, New Hampshire.

*Treasurer.*

Dr. J. BERRIEN LINDSLEY, Nashville, Tennessee.

On the Executive Committee to fill the places of Prof. CHARLES N. HEWITT, Major CHARLES SMART, and Dr. PINCKNEY THOMPSON, the following were elected :

Prof. GEORGE H. ROHE, Baltimore, Maryland.

Hon. D. P. HADDEN, Memphis, Tennessee.

Dr. FREDERICK MONTIZAMBERT, Quebec, Canada.

The invitation from Memphis, Tennessee, to make it the place of the next annual meeting of the Association was accepted, the time to be fixed by the Executive Committee.

Respectfully submitted :

F. MONTIZAMBERT, *Secretary*.

## REPORT OF THE COMMITTEE ON STATE BOARDS OF HEALTH.

The Committee on State Boards of Health respectfully report, 1st, that the resolution of this Association, reading as follows,—

*Resolved*, That the representatives of state boards of health constitute a section of the American Public Health Association, to be called the “Section of the State Boards of

Health," which shall elect its own chairman and secretary; and that the Executive Committee, through the secretary, arrange for the meeting of this section on the day preceding the general session of the American Public Health Association; and that the Executive Committee arrange a day, or portion of a day, during the general session, for the exclusive consideration of matters relating to state boards of health, and for the reception of reports and propositions from the section of state boards,—

was submitted to the National Conference of State Boards of Health, and, after full discussion, was lost. A substitute, proposed by the State Board of Health of Kentucky, reading as follows, was also lost :

*Resolved*, That the representatives of the state boards of health constitute a section of the American Public Health Association, to be called Section One of the Conference of State Boards of Health. This section shall hold its annual meeting at the place and on the day preceding the meeting of the Association, and at such other times and places as it may find necessary; shall elect its own officers, and make its own rules; and shall present so much of its work as it may think proper to the Association, subject to the approval of the Executive Committee of that body.

The committee respectfully further suggest to this Association that a specified time be regularly assigned in our programme for such communications as state boards of health or their representatives have to make to this Association, believing that in that way the already firm and cordial relations between these official bodies and this Association will be the more firmly cemented and the fullest mutual benefit be derived.

Respecting the subject of inter-state notification of the outbreak of small-pox, cholera, and yellow fever, we have to report that the subject has been considered by the National Conference of State Boards of Health, and the following resolutions were adopted. They are submitted as a part of this report of the proceedings of that body.

WHEREAS, It is necessary for the protection and preservation of the public health that prompt information should be given of the existence of cholera, yellow fever, and small-pox,—be it

1. *Resolved*, That it is the sense of the National Conference of State Boards of Health that it is the duty of each state, provincial, and local board of health, in any locality in which said diseases may at any time occur, to furnish immediately information of the existence of such disease to boards of health of neighboring and provincial states, and to the local board in such states as have no state board.

2. *Resolved*, That upon rumor or report of the existence of pestilential disease, and positive definite information thereon not being obtainable from the proper health authorities, this Conference recommends that the health officials of one state shall be privileged and justified to go into another state for the purpose of investigating and establishing the truth or falsity of such reports.

3. *Resolved*, That whenever practicable the investigations made under the preceding section shall be done with the coöperation of the state or local health authorities.

4. *Resolved*, That any case which presents symptoms seriously suspicious of one of the aforementioned diseases shall be treated as suspicious, and reported as provided for in cases announced as actual.

5. *Resolved*, That any case respecting which reputable and experienced physicians disagree as to whether the disease is or is not pestilential shall be reported as suspicious.

6. *Resolved*, That any case respecting which efforts are made to conceal its existence, full history, and true nature shall be deemed suspicious, and so acted upon.

7. *Resolved*, That in accordance with the provisions of the foregoing resolutions, the



boards of health of the United States and Canada represented at this conference do pledge themselves to an interchange of information as herein provided.

Respectfully submitted :

C. N. HEWITT.

E. M. HUNT.

JOSEPH HOLT.

FREDERIC H. GERRISH.

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## REPORTS OF THE COMMITTEES OF AWARD ON THE LOMB PRIZE ESSAYS.

Your committee who have been charged with the duty of examining the essays on "The Sanitary Conditions and Necessities of School-Houses and School-Life," which have been contributed in competition for the prize of five hundred dollars, beg to report that they have carefully read the twelve essays which they have received from the secretary, and find that none of them are, in their opinion, such productions as are contemplated by the donor of the prize. Three of them, bearing the mottoes "Architectus medicina non Sit ignarus," "God and my right," and "The new Levana," deserve recognition for merit in the order named; but your committee do not feel that they can report any one of them to the Association as being of the high standard of excellence which a prize of such value presupposes, nor are they willing to have any of them go before the world bearing their endorsement to this effect. In their opinion, besides sound doctrine and good advice, an essay which this Association accepts as the equivalent of a prize of five hundred dollars should exhibit the highest literary merit and that careful construction and arrangement which should characterize a concise, systematic, and practical treatise on the subject-matter intended for the instruction and benefit of the public.

All which is respectfully submitted :

ALBERT L. GIHON, *Medical Director U. S. Navy.*

CHARLES SMART, *Major and Surgeon U. S. Army.*

CHARLES A. LINDSLEY, *Secretary State Board, Conn.*

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The committee to whom was assigned the prize essays on "The Preventable Causes of Disease, Injury, and Death in American Manufactories and Workshops, and the Best Means and Appliances for Preventing and Avoiding them," beg leave to report that they have attended to their duty, and would respectfully report that in their opinion no essay was submitted that was worthy of a prize.

G. P. CONN,  
*For the Committee.*

The Committee of Award on "Plans for Dwelling-houses" would respectfully report that only three plans were offered for a dwelling-house not to exceed \$800, and only two for the house to cost not to exceed \$1,600. The plans were defective as to the details as set forth in the Preliminary Circular, and the committee for this, if for no other reasons, could not make an award. We are therefore compelled to report that none of the plans offered come up to the design of the prizes.

(Signed)

E. M. HUNT.

GEORGE E. WARING, JR.

CHARLES W. HEWITT.

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## REPORT OF COMMITTEE ON DISPOSAL OF THE DEAD.

The Committee on the Disposal of the Dead beg leave to report that since the last meeting of the Association very few facts bearing on the subject have been brought to their attention, either from sanitary reports or from the medical literature of the year.

It is only in the case of sudden and violent irruptions of disease or a great epidemic that the failure of the ordinary modes of burial can be realized, or properly brought to the notice of the people. During the past year no such outbreaks have occurred, and the consequence is, that no attention has been given especially to the matter. The constitution of the human mind is such that it is not prepared or willing to foresee or guard against danger;—it hopes; it waits with an indifference worthy of fatalism. A slight earthquake at Charleston will do more to make strong walls by the use of good lime, than all the teachings and warnings of architects and builders: and so it will be with the question of the disposal of the dead. Some sudden and unlooked-for calamity will come upon the land, and then the people, and the medical profession as well, now so hopeful or so incredulous, will be roused to the necessity of some radical measures, not only to correct present evils, but to protect all who come after us. The strong argument employed by those who do not deny the possibility of danger is, that there is no immediate, no pressing, need of reform; that our country is not over-crowded, and that we may safely wait for the approach of danger. This is not a wise or a humane argument. Posterity has done nothing for us, it is true; but one of the reasons of our being here is to prepare the way for those who are to follow us,—plan all things for their safety, and make the earth a pleasant abiding-place.

Notwithstanding the apathy to which we have alluded, the subject has not been entirely neglected. A report was made at the meeting of the American Medical Association at St. Louis, in May last, favoring cremation, and a resolution introduced embodying the sentiments of the report. The temper of the Convention was evidently in favor of cremation; but

the absence of any pressing need and the wisdom of longer delay before adopting so radical a measure were urged, and finally accepted. A special committee, however, was appointed to still further investigate the subject, and report at the meeting next year.

The question of burial reform is attracting more attention in England at this time than in any other country. The London *Lancet*, whilst it claims the first place for burial, among the various methods which have been adopted for the disposal of the dead, admits the need of reform of our present customs of interment. It acknowledges traditional errors in this respect, and argues for greater simplicity. It says,—“We are made of the earth, and we but follow the laws of all created forms when our bodies are finally restored to the earth; but if we maintain this rule, the stout case in which we are wont to enclose the dead, and fruitlessly to forbid decay, must be abandoned. To retain its use is a blot upon our civilization. We corrupt nature while we profess to copy her, and we store up for ourselves, under our very feet, the accumulated and postponed decay of many years. The more perishable the covering, the better for our purpose, and the better for the health of the community.” The Church of England Funeral Reform Association, to which we referred in our report of last year, is pursuing its labors in the same line. This association is composed of the leading gentlemen of England. At a late meeting, the Bishop of London and the Duke of Westminster agreed in recommending to all classes, especially to the wealthy, the duty of asserting, by example, the need of reform in our mode of burial. It is by organizations of this kind, composed of the wealthy and intellectual classes, that we may expect to influence public opinion, and finally bring about necessary improvements.

The “earth-to-earth” system advocated by Mr. Seymour Haden, the details of which were given in our previous report, is the favorite mode adopted by these modern advocates of burial reform. Mr. Frederick W. Lowndes, of Liverpool, who has witnessed, in the last seventeen years, the removal of five burial-grounds and the exhumation of hundreds of bodies therefrom, as well as of others for medico-legal purposes, is a strong advocate of the “earth-to-earth” system. He says,—“Admitting, which I freely do, all the advantages of cremation, I see many objections to, and difficulties in the way of, its general adoption. Hence, it appears to me wiser that we should concentrate all our efforts in improving the present mode of burial. In three cases of poisoning by arsenic, in which the deceased were just above the level of paupers, and had been buried in common graves, the coffins,—all of pine deal,—were intact after ten months’, fifteen months’, and even three and a quarter years’ burial. I have seen, in a damp soil, coffin boards preserved after thirty or forty years’ burial. These facts of the past ought to guide us in our regulations for the future. The leaden coffins, with vault or bricked grave burials, are slowly becoming things of the past. But the wooden coffins still used are too massive and heavy, as well as much too imperishable. It is evident that even pine deal, which is said to be the most perishable



of all woods, is not perishable enough. It is therefore unsuitable, and some other material is desirable."

Sir Spencer Wells, writing on the same subject, says,—“In this metropolitan district, in the twenty-five years, 1859 to 1883, the deaths registered numbered 1,896,314. Of course the dead have been buried, and, with scarcely an exception, in and around London. Grant that in ten years a body may become harmless,—although I do not at all believe that it does so within twenty years in our soil and climate,—can any imagination conceive the enormous mass of decaying animal matter by which we are surrounded? Could any one be surprised at the outbreak of some devastating pestilence a hundred fold more destructive than the plague or black death of the Middle Ages?”

The sanitary and judicial aspects of cremation were thoroughly discussed in the Academy of Medicine of Ireland in April last. Doctor Tweedy read a paper on the subject. He alluded to the condition of graveyards which gave rise to the Southwood Smith Commission in 1849, and proceeded to show that the dangers arising from the present mode of sepulture were to be traced partly to the contamination of air and water by the gases of decomposition and other putrefactive matter, and partly by the fact that the germs of zymotic diseases not only retained their vitality in graves, but are capable of indefinite propagation under favoring conditions of heat and moisture. The registrar-general for Ireland (Dr. Grimshaw) said the question of cremation was one of great and growing importance. Its sanitary aspect admitted of no discussion, and its sentimental aspect scarcely concerned the medical profession; but its medico-legal aspect required careful consideration in the interests of the public, having regard to the risk of cremation being made use of as a readier method than others to get rid of suspicious cases. Dr. Athill had long been in favor of cremation, and regretted that the good old system of ancient times was not still carried out. Dr. Henry Kennedy said the question of expense was worthy of consideration in connection with the subject, as the cremation of paupers would be a considerable tax on the country. He did not believe in the great danger to health alleged to arise from interment. There was no evidence that graveyards were a source of sickness, and therefore it might fairly be questioned that the mischief alleged to arise from such contamination was exaggerated. Dr. John William Moore regarded the argument from sentiment as altogether in favor of cremation. In the Bible there was nothing, from beginning to end, opposed to cremation. Dr. Henry Kennedy had not given sanitary or preventive medicine sufficient credit, nor could he agree with him as to the comparative innocuousness of the round of nature which he had described. The President (Dr. Jacob) held with the registrar-general that the sanitary aspect of the question was not open to dispute. Indeed, any system by which the results of decomposition could be got rid of would be a boon. Dr. Tweedy's paper had satisfied him that the medico-legal difficulties in the way of cremation had been thoroughly met. It was only in one of twenty thousand cases that judicial considerations

intervened, and a suspicion arose to justify exhumation; and therefore, as regards cremation, they had to deal but with that one case in which the law found it necessary to protect the public against foul play.

Another reform in modes of burial has been suggested by Col. T. Martin, formerly sanitary commissioner in Bombay and Scinde. Col. Martin advocates cremation in certain conditions, but prefers, for reasons of his own, to preserve the practice of burial, subject to great changes in the method. He does not advise the "earth-to-earth" system, and the use of perishable coffins. He recommends air-tight and durable coffins, fitted with valves to open under-ground. He suggests the plan of subterranean ventilating tubes, with shafts rising high above the ground to carry off the putrid gases, the purpose of the whole arrangement being to permit spontaneous decomposition without the body's coming in contact with the earth. For seaport towns he has devised a somewhat similar plan, the coffins being made impervious, and thrown into the sea. Col. Martin does not like the "earth-to-earth" system, for the reason, he says, "that the absorption of decaying matter by the soil contaminates the neighboring springs, and because he believes that there is greater danger of contagion if bodies are buried in lightly made cases instead of close coffins. We do not think Col. Martin's original and ingenious system will meet with much favor. It is entirely too expensive and complex. It, however, forms a part of the literature of the subject for the year.

The most notable event of the time in connection with the disposal of the dead has been the action of the Roman Inquisition, which, by a decree dated May 19, 1886, has forbidden Catholics to join cremation societies, or to have their bodies cremated after death. This decree has been confirmed by the Pope. How far this action of the Vatican will influence public opinion on this subject is yet to be determined. The church claims control over the body not only during life, but after death. The state may at a future time determine that "earth-to-earth" burial is detrimental to the public safety, and thus a conflict as to the things which are Cæsar's may arise. Such a conflict would be most unseemly, and much to be deplored. Notwithstanding the disapproval of the church, a congress of those favoring cremation in Italy and Germany is to meet during the present month.

The suggestion, made in the report of last year, that the bodies of all persons dying from zymotic diseases should be cremated, might, in obedience to public opinion, be modified so as only to compel, by municipal or state law, the use of destructive agents to bring about the rapid disintegration of the dead body. Caustic lime or chloride of zinc are agents that could be properly employed for this purpose. The very general belief in the germ theory, which prevails on all sides, would render a compulsory law of this character acceptable to the people. Those sanitarians who are not prepared to accept the more radical process of cremation by fire might, with great consistency, endorse this slower but equally potent form of destruction. A law of this character is particularly desir-

able in large cities. Children dying from diphtheria and scarlet fever are frequently kept in public vaults for a year or more before burial. A recent examination of a church in England, that of St. Mary Woclnoth, will illustrate the danger of this practice. Complaints had been made for a long time of bad smells which prevailed in the building. On examination, hundreds of bodies undergoing decomposition were found underneath the floor. The last of these was buried, or rather entombed, many years ago; but from the conditions of interment, they, with their massive coffins, are still decaying, and are thus at this late day yielding to the congregations worshipping in the church the gases of putrefaction.

Burial in vaults should be absolutely forbidden by legal enactment. The burial of persons dying by zymotic diseases should also be placed by law in the hands of the health authorities, and not left to the whims or caprice of families. This suggestion, made in our former report, we deem a vital one; and we shall reiterate it constantly until it meets with final acceptance. The vanity of the living must give way to the safety of the living; and the sooner science, philosophy, and religion adopt this view, the better for mankind.

In conclusion, your committee respectfully urge the continuance of this work in other and newer hands. The experience and developments of each year add to our knowledge of the subject; and if a committee is in existence, its members will watch faithfully all passing events that may serve to furnish details and facts to instruct and guide the people, who, without a guide, are blind on all subjects of sanitation.

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## REPORT OF COMMITTEE ON ANIMAL DISEASES AND ANIMAL FOODS.

Your committee would respectfully report that much attention has been devoted, during the past year, to the subject of animal diseases, and the effect of these upon the food-supply and health of our people.

We believe that there is a great and urgent necessity for a more systematic and thorough inspection of animals about to be slaughtered, of their carcasses after slaughter, and of the cows from which is drawn the milk-supply of our towns and cities. We have reason to believe that the remarks of Dr. Bryce on this subject are only too well founded upon the observation of facts—observations which can be easily repeated at any time and in almost any place. Milk from cows in the advanced stages of tuberculosis goes into our markets almost without a protest, and animals affected with tuberculosis are slaughtered for food; their fat is made into imitation butter, and is consumed without having been heated sufficiently to destroy the germs of this disease.

The recent outbreak of contagious pleuro-pneumonia, or lung plague of cattle, which is now in progress in the city of Chicago, the great live-



stock centre of the country, makes it quite probable that we may have an epizootic of this disease of proportions beyond anything that has been heretofore anticipated. A crisis has been reached in the cattle industry of the United States; and without prompt and united action this great source for the supply of cheap and excellent food will be limited in quantity and deteriorated in quality. Fortunately pleuro-pneumonia virus does not affect the human species; but unfortunately it is a disease which progresses so slowly that there is a great temptation to the owners of affected cattle to dispose of the milk and flesh of animals which are suffering with a high grade of fever. In the later stages of the disease there may be septic infection from absorption of purulent matter from the lungs; and in such cases we consider the meat decidedly dangerous to human health.

Your committee, appreciating the gravity of the danger that this plague may spread over our continent, urgently request every member of this Association to use his influence to secure the adoption and rigid enforcement of measures for its extirpation.

In regard to other diseases, we find hog cholera more prevalent the present year than usual, and there is a probability that its ravages will have the effect to largely advance the price of hog products. Glanders of horses, the contagion of which also produces a fatal disease in people, has been disseminated broadcast over our country. These and other contagious diseases of animals, which have an important influence upon the health and wealth of our people, should be controlled and stamped out by the rigid enforcement of appropriate laws. The work is a new one in this country: there are deep-seated prejudices and enormous commercial combinations which stand in the way; but our sanitarians have overcome such influences in the past, and they doubtless will continue to grapple with them successfully in the future.

D. E. SALMON, *Chairman.*

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#### REPORT OF COMMITTEE ON NECROLOGY.

E. S. CHESBROUGH, C. E., was born in Baltimore county, Md., July 6, 1813; died in Chicago, August 18, 1886. In 1828 the Baltimore & Ohio Railroad Company was engaged on the preliminary surveys of its line, and Mr. Chesbrough found employment in one of the parties as chainman. In 1830 he was appointed assistant engineer on the Allegheny Portage Railroad, then being surveyed by Col. Stephen H. Long. In the summer of 1831 Mr. Chesbrough became assistant engineer under Capt. Wm. Gibbs McNeill, of the topographical engineers, and then chief engineer of the Paterson & Hudson Railroad, and in that year located nearly the whole of the road, besides making preliminary surveys for a line from Jersey City to Newark, N. J. From 1831 to 1836

he was engaged in locating and constructing the Boston & Providence Railroad and other roads. From 1837 to the middle of 1842 he was engaged in railroad construction in South Carolina and adjacent states. In 1846 he was asked to become the chief engineer of the western division of the Boston water-works. Realizing his lack of knowledge of hydraulic engineering, Mr. Chesbrough was averse to accepting the position, but, being urged, finally accepted. In 1850 he was made sole commissioner of the Boston water-works. He investigated the English system of sewerage, and upon his report it was introduced into this country. In 1855 he resigned his position as city engineer of Boston to commence his great work of providing Chicago with a system of sewerage. In the winter of 1856-'57 he visited Europe, and having made a careful study of the principal systems of sewerage there, made a report thereon in 1858. To him was due the conception and construction of the entire water-works scheme by which Chicago is supplied with an abundance of excellent water. In 1880, when the subject of the extension of the New York city water-supply came up, Mr. Chesbrough was consulted, and appointed consulting engineer of the department. In 1882 he went to Europe, and spent several months in inspecting high masonry dams in southern France and Spain. His report was the basis upon which the Quaker Bridge dam, which is of unprecedented magnitude, was designed. This was the last work upon which he was engaged. He had a high and lofty view of personal honor, was a great student to the last, extremely modest in the expression of his opinions, and possessed courage to face both moral and physical obstacles.

ELLSWORTH E. HUNT, M. D., son of Ezra M. Hunt, M. D., grandson of Rev. H. W. Hunt, was born in Middlesex county, N. J., May 15, 1855; died in Pensacola, Fla., August 17, 1886. He commenced the study of medicine in 1876, having been educated at Princeton college. He attended three courses of medical lectures at Columbia Medical College, N. Y., and was graduated from the same. Commenced the practice of medicine in New York city in 1883. Was a member of the N. Y. State Medical Society. He was surgical attendant at Roosevelt Hospital, and assistant at Manhattan Eye Infirmary. Member of the Presbyterian church.

Hon. ERASTUS BROOKS was born in Portland, Me., January 31, 1815; died in West New Brighton, Staten Island, N. Y., November 25, 1886. His father assisted in the defence of the port of Portland in the War of 1812, and was lost at sea during the September gale of 1814, five months before Erastus Brooks was born. He began his editorial life very early, and finally with his brother, James Brooks, edited the New York *Express*. In politics he was an Old Line Whig up to the time of the Rebellion, when he joined the Democratic party. At the time of his death he was president of the New York Deaf and Dumb Institution; a director in the Cornell University from its commencement; member of

the state board of health ; and chairman of the Indian commission. He was a member of the legislature four years, from 1880 to 1884. As editor of the New York *Express* he labored forty-one years. After the purchase of the *Express* in 1877 by a Tammany Hall syndicate, Mr. Brooks ceased all editorial labors, although he was for a considerable time general manager of the New York Associated Press, a position for which his long connection with one of the oldest of the New York daily papers had peculiarly prepared him. In the legislature he was accorded and held the foremost positions on committees, in debates, and business, and was notable for his zeal and devotion in behalf of measures concerning the general welfare, the health, the morals, and the educational interests of the state. His faculties were keen, clear, and vigorous, and no good cause found him a tardy or half-hearted worker.

AUSTIN FLINT, M. D., LL. D.,<sup>1</sup> was born in Petersham, Mass., October 20, 1812. He was descended from Thomas Flint, who came from Matlock, Eng., in 1638, and settled in Concord, Mass. His father was Joseph Henshaw Flint, a distinguished surgeon of Northampton, Mass. Austin Flint, after attending Amherst and Cambridge colleges for three years, entered the medical department of Harvard college, and after a full course received his degree of M. D. in that institution in 1833. In 1836 he settled in Buffalo, having meanwhile practised in Boston and Northampton. In 1844 he was appointed to the Chair of the Institutes and Practice of Medicine in the Rush Medical College, Chicago, but relinquished the position at the end of the year. He conducted the Buffalo *Medical Journal*, founded in 1846, with marked ability. In 1847 he was associated with Profs. White and Hamilton in the founding of the Buffalo Medical College, in which institution, until 1852, he was Professor of the Principles and Practice of Medicine and Clinical Medicine. In the latter year he was appointed to the Chair of Theory and Practice of Medicine in the University of Louisville, which he retained until 1856, when he resumed his connection with the college at Buffalo as Professor of Pathology and Clinical Medicine. The winters of 1858-'59, 1859-'60, and 1860-'61 he passed in New Orleans, holding the positions of Professor of Clinical Medicine in the Medical School, and visiting physician to Charity Hospital. In 1859 he removed from Buffalo to New York, where he afterward remained. In 1861 he was appointed one of the physicians to Bellevue Hospital, and Professor of the Principles and Practice of Medicine and Clinical Medicine in the Bellevue Hospital Medical College, having previously been appointed Professor of Pathology and the Practice of Medicine in the Long Island College Hospital. He resigned the latter position in 1868. In 1872 he was elected president of the New York Academy of Medicine. He was a member of the leading American medical and scientific societies, and a corresponding member of various European organizations of a similar character. In 1884 he was president of the American Medical Associa-

<sup>1</sup>*Sanitarian*, April, 1886.



tion ; in 1876 was a delegate to the International Medical Congress which met at Philadelphia, where he delivered his famous address on "Medicine ;" attended the Medical Congress at London in 1881, and that at Copenhagen three years later, and was chosen president of the next Congress, which will be held at Washington in 1887. He had been invited, and had accepted the invitation, to deliver the opening address at the forthcoming meeting of the British Medical Association, an honor that no other American physician has received. As a writer he early became an authority, and as a contributor to medical literature he was among the foremost promoters of medicine in modern times. Indeed, his works may be pronounced classical wherever truth is sought as the foundation of the art and science of medicine. He died of apoplexy, at his residence in New York, March 13, 1886, after only fourteen hours' illness.

Prof. WILLIAM RIPLEY NICHOLS died in Hamburg, Germany, July 4, 1886, aged 39 years. He graduated from the Roxbury Latin school at the age of sixteen, then spent two years in travel and study in Europe, and returning, entered Harvard university. In a few months he withdrew from the university and connected himself as a student with the Massachusetts Institute of Technology, then in its infancy, and was graduated with the class of 1869. He was immediately chosen instructor in chemistry in the institute ; in 1870 he was chosen assistant professor ; and in 1872 he accepted the Chair of General Chemistry in the institute, which he retained until the time of his death. His early researches were in the field of inorganic chemistry ; but in 1870 he turned his attention to sanitary chemistry, and to what afterward became his specialty—water-supply, and questions relating to it. He was employed by the Massachusetts State Board of Health to examine into the condition of the prominent rivers in the state, and was often consulted upon matters relating to the public health. His opinion on subjects relating to water-supply had great weight not only in America, but also throughout Europe. He received a medal from the London Health Exhibition in recognition of his eminence as an authority. His publications relating to sanitary chemistry number forty-four, the most important being "Water-Supply, Chemical and Sanitary." In conjunction with Prof. John Trowbridge and Dr. Samuel Kneeland he prepared the "Annals of Scientific Discovery" for 1869 and 1870. In 1881, in consequence, doubtless, of overwork, the disease which finally ended his life attacked him, and his last five years were years of constant pain and weakness. Twice he sought relief by aid of the surgeon's knife, but the second operation resulted fatally.

FRANK HASTINGS HAMILTON, M. D., LL. D.,<sup>1</sup> was born in Wilmington, Vt., September 10, 1813. He began the study of medicine while a mere boy, and received his degree from the University of Pennsylvania

<sup>1</sup>*Sanitarian*, September, 1886.

in 1833. He began practice in his native place, but soon after removed to Auburn, N. Y. Five years after he settled in Auburn he was appointed Professor of Surgery in the Fairfield (N. Y.) Medical School, but not liking the place, he soon accepted a similar appointment at the Geneva (N. Y.) Medical College, where he remained four years; thence went to Buffalo, where, in association with the late Dr. Austin Flint, he aided in founding the medical department of the University of Buffalo, in which he was Professor of Surgery. In 1860, while still retaining his professorship in Buffalo, he went to Brooklyn, where he was chosen Professor of Surgery in the Long Island College Hospital. In 1861 he entered the army, and was first attached to the Thirty-first New York Regiment. He was successively promoted to brigade surgeon (the latter after the battle of Bull Run), corps surgeon under Gen. Keyes in 1862, and medical inspector of the United States Army in 1863. Dr. Hamilton was one of the founders of Bellevue Hospital Medical College, and held its Chair of Surgery until 1875, when he resigned. His famous "Treatise on Fractures and Dislocations," first published in 1860, is justly regarded as the best book on that subject in existence. He was a prolific writer, a liberal contributor to medical periodical literature, and the author of a number of papers on medico-legal and sanitary subjects. But the work which Dr. Hamilton appears to have regarded with the greatest pride was his "Treatise on the Principles and Practice of Surgery." After he had finished it he remarked to his daughter,— "Well, now my life is completed." For many years previous to his death he was a member of the leading medical associations of the United States and of New York, of several of which he had been president. He was a man of sterling worth, and greatly beloved by those who knew him best, and is a great loss to the medical profession. His death occurred from pulmonary disease, at his home in New York, August 11, 1886, in his seventy-third year.

Dr. DESAULT GUERNSEY was born in the town of Milan, Dutchess county, N. Y., June 13, 1830, and died at Amenia, N. Y., December 9, 1885. At an early age he removed to the city of New York with his father, Dr. Peter B. Guernsey, who for many years was a prominent physician of that city. He was educated and fitted for college at the grammar school of the New York University, studied medicine in the office of his father and Dr. Willard Parker, attending lectures at the College of Physicians and Surgeons, from which institution he was graduated in 1850. Dr. Guernsey served for eighteen months in the surgical departments of Bellevue Hospital, and shortly after the expiration of his term of service here he received the appointment of assistant physician to Marine Hospital Quarantine, where, after serving about a year, his health became seriously impaired by an attack of typhus fever, and he resigned his position and settled at Pine Plains, Dutchess county, N. Y. Here he practised medicine until 1862, when he entered the army, being appointed surgeon to the 174th N. Y. Vols. by Gov. Mor-

gan. On leaving the army he settled at Amenia, where, in the fall of 1861, he married Miss Lydia, daughter of Joseph Reynolds, Esq., one of the foremost citizens of that place, where he remained in active practice up to the time of his death. One child—a son—was born to them, who graduated from Columbia college, class of 1886. The doctor's widow survives him. He joined the Dutchess County Medical Society in 1866, was its vice-president in 1867-'68-'69-'70-'77-'78, and president in 1879-'80. Was elected delegate to the state society in 1871, and elected a permanent member in 1876. Was a member of the American Medical Association, of the American Public Health Association from its foundation, and of the New York State Medical Association, of which latter he was vice-president at the time of his death. The cause of his death was aneurism of the aorta.



ANNUAL REPORT OF DR. J. BERRIEN LINDSLEY, .  
*Nashville, Tennessee, Treasurer of the American Public Health  
 Association, October 5, 1886.*

## RECEIPTS.

Balance brought forward, . . . . .	\$1,095.03
From sale of <i>Public Health</i> , . . . . .	224.40
From annual fees of members, . . . . .	1,720.00
Cash for Committee on Epidemics, . . . . .	530.00
From Henry Lomb, Esq., . . . . .	1,903.00
Total, . . . . .	<u>\$5,472.43</u>

## DISBURSEMENTS.

Printing, binding, and distributing Vol. XI of <i>Public Health</i> , . . . . .	\$1,197.95
Secretary's postage, stationery, and help, . . . . .	309.05
Treasurer's postage and help, . . . . .	71.99
Secretary's travelling expenses, . . . . .	62.45
Treasurer's travelling expenses, . . . . .	104.50
Printing for Committee on Disinfectants, . . . . .	131.35
Miscellaneous printing, . . . . .	267.62
Lomb Prize Essays, awards and expenses, . . . . .	1,903.00
Net expenses on printing and publishing the above, . . . . .	<u>303.18</u>
	<u>4,351.09</u>
Balance cash on hand, . . . . .	\$1,121.34

The above expenditures were ordered by the Executive Committee, and vouchers are herewith submitted.

J. BERRIEN LINDSLEY, *Treasurer.*

## CONTRIBUTIONS TO THE COMMITTEE ON DISINFECTANTS.

State Board of Health, California, . . . . .	\$25.00
Rhode Island, . . . . .	10.00
South Carolina, . . . . .	25.00
Kansas, . . . . .	10.00
Iowa, . . . . .	25.00
Kentucky, . . . . .	25.00
Maine, . . . . .	15.00
Lunacy and Charity, Mass., . . . . .	50.00
Board of Health, Pittsburgh, Penn., . . . . .	35.00
Worcester, Mass., . . . . .	10.00
Charleston, S. C., . . . . .	25.00
Boston, Mass., . . . . .	25.00
Allegheny, Penn., . . . . .	10.00

Local Committee of Arrangements, St. Louis, Mo.,	.	.	.	.	.	.	.	\$50.00
From Dr. Geo. M. Sternberg,	.	.	.	.	.	.	.	50.00
State Board of Pennsylvania,	.	.	.	.	.	.	.	15.00
Louisiana,	.	.	.	.	.	.	.	25.00
Connecticut,	.	.	.	.	.	.	.	50.00
Wisconsin,	.	.	.	.	.	.	.	25.00
Michigan,	.	.	.	.	.	.	.	25.00
St. Louis,	.	.	.	.	.	.	.	10.00
Total, . . . . .	.	.	.	.	.	.	.	<u>\$540.00</u>

TORONTO, CA., Oct. 7, 1886.

TO THE PRESIDENT OF THE AMERICAN PUBLIC HEALTH ASSOCIATION:—

*Sir*:—The undersigned, an Auditing Committee appointed to audit the Treasurer's account for the year ending Oct. 5, 1886, respectfully report that they have examined the vouchers, and find the same correct.

Respectfully submitted,

GUSTAVUS DEVRON, *Chairman.*

JAS. F. HIBBERD,

R. HARVEY REED,

*Auditing Committee.*

CONSTITUTION  
OF THE  
AMERICAN PUBLIC HEALTH ASSOCIATION.

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TITLE.

I. This Association shall be called "THE AMERICAN PUBLIC HEALTH ASSOCIATION."

OBJECTS.

II. The objects of this Association shall be the advancement of sanitary science and the promotion of organizations and measures for the practical application of public hygiene.

MEMBERS.

III. The members of this Association shall be known as Active and Associate. The Executive Committee shall determine for which class a candidate shall be proposed. The *Active* members shall constitute the permanent body of the Association, subject to the provisions of the constitution as to continuance in membership. They shall be selected with special reference to their acknowledged interest in or devotion to sanitary studies and allied sciences, and to the practical application of the same. The *Associate* members shall be elected with special reference to their general interest only in sanitary science, and shall have all the privileges and publications of the Association, but shall not be entitled to vote.

Delegates from national, state, provincial, and municipal boards of health, organized sanitary associations, and the army, navy, and marine hospital service, shall be entitled to be enrolled as active members upon presentation of their credentials to the Executive Committee. Members, not delegates from such bodies, shall be elected as follows:

Each candidate for admission shall first be proposed to the Executive Committee, in writing (which may be done at any time), with a statement of the business or profession and special qualifications of the person so proposed. On recommendation of a majority of the committee, and on receiving a vote of two thirds of the members present at a regular meeting, the candidate shall be declared duly elected a member of the Association. The annual fee of membership in either class shall be five dollars.



## OFFICERS.

IV. The officers shall be a President, a First and Second Vice-President, a Secretary, and a Treasurer.

All the officers shall be elected by ballot, annually, except the Secretary, who shall be elected for a term of three years.

## PRESIDING OFFICER.

V. The President, or in his absence, one of the Vice-Presidents, or, in their absence, a Chairman *pro tempore*, shall preside at all meetings of the Association. He shall preserve order, and shall decide all questions of order, subject to appeal to the Association. He shall also appoint all committees authorized by the Association, unless otherwise specially ordered.

## SECRETARY.

VI. The Secretary shall have charge of the correspondence and records of the Association; and he shall also perform the duties of Librarian. He, together with the presiding officer, shall certify all acts of the Association. He shall, under the direction of the Executive Committee, give due notice of the time and place of all meetings of the Association, and attend the same. He shall keep fair and accurate records of all the proceedings and orders of the Association; and shall give notice to the several officers, and to the Executive and other Committees, of all votes, orders, resolves, and proceedings of the Association, affecting them or appertaining to their respective duties.

## TREASURER.

VII. The Treasurer shall collect and take charge of the funds and securities of the Association. Out of these funds he shall pay such sums only as may be ordered by the Association, or by the Executive Committee. He shall keep a true account of his receipts and payments, and at each annual meeting render the same to the Association, when a committee shall be appointed to audit his accounts. If from the annual report of the Treasurer there shall appear to be a balance against the treasury, no appropriation of money shall be made for any object but the necessary current expenses of the Association, until such balance shall be paid.

## STANDING COMMITTEES.

VIII. There shall be the following standing committees: (1) The Executive Committee, (2) the Advisory Council, (3) the Committee on Publication.

## EXECUTIVE COMMITTEE.

IX. The Executive Committee shall consist (1) of the President, First Vice-President, Second Vice-President, Secretary, and Treasurer; (2) of six active members, of whom three shall be elected annually by ballot, to

serve two years, and who shall be ineligible to reelection for a second successive term ; and (3) of the ex-Presidents of the Association.

It shall be the duty of the Executive Committee to consider and recommend plans for promoting the objects of the Association ; to authorize the disbursement and expenditure of unappropriated moneys in the treasury for the payment of current expenses ; to consider all applications for membership, and, at the regular meetings, report the names of such candidates as a majority shall approve ; and, generally, to superintend the interests of the Association, and execute all such duties as may, from time to time, be committed to them by the Association. At least one month preceding the annual meeting of the Association, the Executive Committee shall cause to be issued to members a notice of such meeting, and they are authorized to publish the same in medical, scientific, and other periodicals, but without expense to the Association ; and such notice shall contain the order of business to be followed at said meeting, and, briefly, the subjects to be presented, and the special points of discussion.

#### ADVISORY COUNCIL.

X. The Advisory Council shall consist of one member from each State, Territory, and District, the Army, Navy, and Marine Hospital Service, the Dominion of Canada, and each of the Provinces, who shall be appointed by the President on the last day of each session, and who, besides acting as a nominating committee of officers for the ensuing year, to be announced at such time as the Executive Committee may appoint, shall consider such questions and make such recommendations to the Association as shall best secure the objects of the Association. They shall at their first meeting elect from their own number a Secretary, whose record of their proceedings shall be made part of the records of the Association.

#### COMMITTEE ON PUBLICATION.

XI. The Committee on Publication shall consist of the Secretary and two active members, selected by the Executive Committee, who shall contract for, arrange, and publish, under authority of the Executive Committee, the proceedings of the Association, including such papers as have been examined and approved by the Executive Committee, or which have been submitted to them by the latter for their discretionary action.

#### REPORTS AND PAPERS.

XII. All committees, and all members preparing scientific reports or papers to be laid before the Association at its annual meetings, must give, in writing, the title of such reports or papers, the time to be occupied in reading them, and an abstract of their contents, to the Executive Committee, at least one week preceding the date of such meeting, to secure their announcement in the order of business.

## MEETINGS.

XIII. The time and place of each annual meeting shall be fixed at the preceding annual meeting, but may be changed by the Executive Committee for reasons that shall be specified in the announcement of the meeting. Special meetings may be called, at any time or place, by concurrence of two thirds of the Executive Committee. There shall be no election of officers, or change of By-laws, or appropriation of money to exceed the amount at that time in the treasury, at such special meeting, except by a vote of a majority of all the members of the Association. Whenever a special meeting is to be held, at least one month's notice shall, if possible, be given by circular, to all the members, together with the order of business.

## QUORUM.

XIV. At the annual meeting nine members shall constitute a quorum for the election of officers, a change of the Constitution, the election of members, and the appropriation of moneys.

## ORDER OF BUSINESS.

XV. The order of business at all meetings of the Association shall be fixed by the Executive Committee, and such order must be completed before any other business is introduced, except such order of business is suspended by a vote of four fifths present.

## ALTERATION OF CONSTITUTION.

XVI. No alteration in the Constitution of the Association shall be made except at an annual meeting, nor unless such alteration shall have been proposed at a previous meeting, and entered on the minutes with the name of the member proposing the same, and shall be adopted by a vote of two thirds of the members present.



## BY-LAWS OF THE EXECUTIVE COMMITTEE.

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### QUORUM.

1. Five members shall constitute a quorum for the transaction of such business as may come before the committee.

### MEMBERS RESTRICTED.

2. No elective member of the Executive Committee shall be at the same time a member of the Advisory Council, if there is another member of the Association from his state or service.

### PARLIAMENTARY USAGE.

3. Cushing's Law and Practice of Legislative Assemblies shall be the guide of parliamentary practice until otherwise ordered.

### PAPERS.

4. All papers presented to the Association must be either printed, type-written, or in plain handwriting, and be in the hands of the Secretary at least twenty days prior to the annual meeting, to insure their critical examination as to their fulfilling the requirements of the Association.

5. If any paper is too late for critical examination, said paper may be so far passed upon by the Executive Committee as to allow its reading, but such paper shall be subject to publication or non-publication as the Executive Committee deem expedient.

6. All papers accepted by the Association, whether read in full, by abstract, by title, or filed, shall be delivered to the Secretary as soon as thus disposed of, as the exclusive property of the Association. Any paper presented to this Association and accepted by it shall be refused publication in the transactions of the Association if it be published, in whole or in part, by permission or assent of its author, in any manner prior to the publication of the volume of transactions, unless written consent is obtained from the Publication Committee.

7. Day papers shall be limited to twenty minutes, and evening papers to thirty minutes, each.

### DISCUSSION OF PAPERS.

8. After the leading papers on each subject, as indicated by the Executive Committee, have been read, discussion shall follow, and be confined strictly to the subject of these papers; and each speaker shall be limited

to ten minutes, and shall not speak a second time until after every other member who desires to be heard, and then only for five minutes, except by unanimous consent.

9. The Chair shall notify gentlemen who desire to speak to send up their names, and they shall be called on in the order sent up, and he may, at his discretion, limit the time of speaking to five instead of ten minutes, if in his judgment it may become necessary to do so in order to allow each one on the list an opportunity to be heard.

#### PUBLICATION COMMITTEE.

10. The Committee on Publication, charged with the duties of selecting and printing the papers and transactions of the Association, shall consist of three active members of the Association, and of whom one shall be the Secretary, appointed by the Executive Committee during the session of the Association, and selected with reference to their facilities of meeting.

11. All papers read by title, and others not definitely passed upon by the Executive Committee, shall be referred to the Publication Committee for critical examination; and said committee is authorized to reject such papers as in its judgment are not worthy of publication, and to omit such others as cannot be included within the limits of the annual volume.

12. The Publication Committee shall procure a copyright on the transactions in the name of the Association, and the committee shall have full charge of the publication of the transactions.

#### APPLICATION FOR MEMBERSHIP.

13. All applications for membership must be made upon the application blank of the Association.

Persons not members, having prepared papers to be presented at the meetings of the Association, shall be proposed for membership at the first business session of the Association.

#### EXPENDITURES.

15. All bills connected with the publication of the transactions shall, upon the approval of the chairman of the Publication Committee and the Secretary, be signed by the President of the Association, and paid by check of the Treasurer directly to the party concerned; and the President shall not approve any bill relating either to publishing or printing without the approval first of the chairman of the committee in charge thereof.

16. Bills for current expenses shall be first approved by the Secretary, then sent to the President, and on his approval they shall be paid by check of Treasurer directly to the parties interested.

17. The actual and necessary travelling expenses of the Secretary and Treasurer to the annual meeting of the Association, and to one meeting of the Executive Committee, shall be classed as current expenses.

RESOLUTIONS.

18. All resolutions presented to the Association shall be sent to the Chair in writing, and referred to a committee without discussion.

ARREARAGES.

19. The arrearages of all members remitting their dues for two years shall be cancelled up to the date of the last payment, but they shall be entitled to the transactions of the Association only for the years for which they have actually paid.

AUDITING COMMITTEE.

20. An Auditing Committee shall be appointed by the Chair to audit the accounts of the Treasurer, and report upon the same.



# OFFICERS AND COMMITTEES

## OF THE

### AMERICAN PUBLIC HEALTH ASSOCIATION.

ORGANIZATION, 1886-1887.

<i>President,</i> . . .	Dr. GEORGE M. STERNBERG, U. S. A., <i>Baltimore, Md.</i>
<i>First Vice-President,</i>	Dr. CHARLES N. HEWITT, <i>Red Wing, Minn.</i>
<i>Second Vice-President,</i>	Dr. CHARLES A. LINDSLEY, <i>New Haven, Conn.</i>
<i>Secretary,</i> . . .	Dr. IRVING A. WATSON, <i>Concord, N. H.</i>
<i>Treasurer,</i> . . .	Dr. J. BERRIEN LINDSLEY, <i>Nashville, Tenn.</i>

(*Ex-officio* Members Executive Committee.)

### STANDING COMMITTEES.

#### EXECUTIVE COMMITTEE.

(Elective.)

Dr. HENRY B. BAKER . . . . .	<i>Lansing, Mich.</i>
Prof. HOSMER A. JOHNSON . . . . .	<i>Chicago, Ill.</i>
Dr. JOSEPH HOLT . . . . .	<i>New Orleans, La.</i>
Prof. GEORGE H. ROHÉ . . . . .	<i>Baltimore, Md.</i>
Hon. D. P. HADDEN . . . . .	<i>Memphis, Tenn.</i>
Dr. FREDERICK MONTIZAMBERT . . . . .	<i>Quebec, Canada.</i>

(The ex-Presidents, *ex-officio* members Executive Committee.)

Dr. STEPHEN SMITH . . . . .	<i>New York city.</i>
Dr. JOSEPH M. TONER . . . . .	<i>Washington, D. C.</i>
Dr. EDWIN M. SNOW . . . . .	<i>Providence, R. I.</i>
Dr. JOHN H. RAUCH . . . . .	<i>Springfield, Ill.</i>
Prof. JAMES L. CABELL . . . . .	<i>University of Virginia, Va.</i>
Dr. JOHN S. BILLINGS . . . . .	<i>U. S. Army.</i>
Prof. ROBERT C. KEDZIE . . . . .	<i>Lansing, Mich.</i>
Dr. EZRA M. HUNT . . . . .	<i>Trenton, N. J.</i>
Dr. ALBERT L. GIHON . . . . .	<i>U. S. Navy.</i>
Dr. JAMES E. REEVES . . . . .	<i>Wheeling, W. Va.</i>
Dr. HENRY P. WALCOTT . . . . .	<i>Cambridge, Mass.</i>

#### ADVISORY COUNCIL.

Alabama, . . .	Dr. JEROME COCHRAN, <i>Mobile.</i>
Arkansas, . . .	Dr. H. C. DUNAVANT, <i>Osceola.</i>
California, . . .	Dr. H. S. ORME, <i>Los Angeles.</i>
Colorado, . . .	Dr. CHARLES AMBROOK, <i>Boulder.</i>
Connecticut, . . .	Dr. R. S. GOODWIN, <i>Thomaston.</i>
Delaware, . . .	Dr. L. P. BUSH, <i>Wilmington.</i>
Florida, . . .	Dr. ROBERT B. S. HARGIS, <i>Pensacola.</i>

Georgia, . . .	Dr. W. H. ELLIOT, <i>Savannah.</i>
Illinois, . . .	Dr. OSCAR C. DEWOLF, <i>Chicago.</i>
Indiana, . . .	Dr. J. D. GATCH, <i>Lawrenceburg.</i>
Iowa, . . .	Dr. J. F. KENNEDY, <i>Des Moines.</i>
Kentucky, . . .	Dr. J. N. MCCORMACK, <i>Bowling Green.</i>
Louisiana, . . .	Dr. L. F. SALOMON, <i>New Orleans.</i>
Maine, . . .	Dr. FREDERIC H. GERRISH, <i>Portland.</i>
Maryland, . . .	Dr. W. G. VAN BIBBER, <i>Baltimore.</i>
Massachusetts, . . .	Dr. S. H. DURGIN, <i>Boston.</i>
Michigan, . . .	Dr. J. H. KELLOGG, <i>Battle Creek.</i>
Minnesota, . . .	Dr. D. W. HAND, <i>St. Paul.</i>
Mississippi, . . .	Dr. WIRT JOHNSTON, <i>Jackson.</i>
Missouri, . . .	Dr. E. M. NELSON, <i>St. Louis.</i>
New Hampshire, . . .	Dr. G. P. CONN, <i>Concord.</i>
New Jersey, . . .	Dr. WILLIAM K. NEWTON, <i>Paterson.</i>
New York, . . .	Dr. ALFRED MERCER, <i>Syracuse.</i>
North Carolina, . . .	Dr. THOMAS F. WOOD, <i>Wilmington.</i>
Ohio, . . .	Dr. R. HARVEY REED, <i>Mansfield.</i>
Pennsylvania, . . .	Dr. BENJAMIN LEE, <i>Philadelphia.</i>
Rhode Island, . . .	Col. GEORGE E. WARING, C. E., <i>Newport.</i>
South Carolina, . . .	Dr. H. D. FRASER, <i>Charleston.</i>
Tennessee, . . .	Dr. J. D. PLUNKET, <i>Nashville.</i>
Texas, . . .	Dr. R. M. SWEARINGEN, <i>Austin.</i>
Vermont, . . .	Hon. HENRY D. HOLTON, <i>Brattleboro'.</i>
Virginia, . . .	Dr. J. G. CABELL, <i>Richmond.</i>
West Virginia, . . .	Dr. C. T. RICHARDSON, <i>Charleston.</i>
Wisconsin, . . .	Dr. J. T. REEVE, <i>Appleton.</i>
Dist. of Columbia, . . .	D. E. SALMON, D. V. M., <i>Washington.</i>
U. S. Army, . . .	Dr. JOSEPH R. SMITH, <i>New York city.</i>
U. S. Navy, . . .	Medical Director ALBERT L. GIBON, <i>Mare Island, Cal.</i>
U. S. M. H. Service, . . .	Dr. JOHN B. HAMILTON, <i>Washington, D. C.</i>
Domin. of Canada, . . .	Dr. CHARLES W. COVERNTON, <i>Toronto.</i>
Prov. of Ontario, . . .	Dr. WILLIAM OLDRIGHT, <i>Toronto.</i>
Prov. of Quebec, . . .	F. N. BOXER, C. E., <i>Montreal.</i>
Manitoba, . . .	Dr. WM. R. D. SUTHERLAND, <i>Winnipeg.</i>
New Brunswick, . . .	Dr. WM. S. HARDING, <i>St. John.</i>

## PUBLICATION COMMITTEE.

THE SECRETARY, *ex-officio.*

Dr. ALFRED F. HOLT . . . . .	<i>Cambridge, Mass.</i>
Dr. GRANVILLE P. CONN . . . . .	<i>Concord, N. H.</i>

## SPECIAL COMMITTEES.

## ON STATE BOARDS OF HEALTH.

Dr. PINCKNEY THOMPSON, President State Board of Health of Kentucky.
Dr. EZRA M. HUNT, Secretary State Board of Health of New Jersey.
Dr. FREDERIC H. GERRISH, President State Board of Health of Maine.
Dr. J. T. REEVE, Secretary State Board of Health of Wisconsin.
Dr. JOSEPH HOLT, President State Board of Health of Louisiana.
Dr. THOMAS F. WOOD, Secretary State Board of Health of North Carolina.

Dr. C. N. METCALF, Secretary State Board of Health of Indiana.

Dr. G. G. TYRRELL, Secretary State Board of Health of California.

Dr. PETER H. BRYCE, Secretary Provincial Board of Health of Ontario.

#### ON DISINFECTANTS.

Maj. GEORGE M. STERNBERG, U. S. A. . . . .	Baltimore, Md.
Prof. GEORGE H. ROHÉ . . . . .	Baltimore, Md.
Maj. CHARLES SMART, U. S. A. . . . .	Washington, D. C.
Prof. V. C. VAUGHAN . . . . .	Ann Arbor, Mich.
Prof. JOSEPH H. RAYMOND. . . . .	Brooklyn, N. Y.
Dr. JOSEPH HOLT . . . . .	New Orleans, La.
Dr. SAMUEL H. DURGIN . . . . .	Boston, Mass.

#### ON THE POLLUTION OF WATER-SUPPLY.

Maj. CHARLES SMART, U. S. A. . . . .	Washington, D. C.
Dr. S. W. ABBOTT . . . . .	Wakefield, Mass.
Dr. G. C. ASHMUN . . . . .	Cleveland, Ohio.
Prof. W. W. DANIELLS . . . . .	Madison, Wis.
Dr. EDWARD PLAYTER . . . . .	Ottawa, Canada.

#### ON THE DISPOSAL OF GARBAGE.

Dr. JAMES E. REEVES . . . . .	Wheeling, W. Va.
Dr. LOUIS LABERGE . . . . .	Montreal, P. Q.
Prof. WILLIAM H. BREWER . . . . .	New Haven, Conn.
CROSBY GRAY, Esq. . . . .	Pittsburgh, Pa.
Prof. V. C. VAUGHAN . . . . .	Ann Arbor, Mich.

NOTE. The chairman is authorized to appoint an additional member from each state, province, etc.

#### ON ANIMAL DISEASES AND ANIMAL FOOD.

D. E. SALMON, D. V. M. . . . .	Washington, D. C.
Dr. PETER H. BRYCE . . . . .	Toronto, Ont.
Dr. EZRA M. HUNT . . . . .	Trenton, N. J.
Prof. JAMES LAW . . . . .	Ithaca, N. Y.
Dr. CHARLES W. CHANCELLOR . . . . .	Baltimore, Md.
Dr. JOHN H. RAUCH . . . . .	Springfield, Ill.
Dr. D. W. HAND . . . . .	St. Paul, Minn.
Lt. Col. JOSEPH R. SMITH, U. S. A. . . . .	New York city.
Dr. JOHN FEE . . . . .	Kansas City, Mo.

#### ON FORMS OF STATISTICS.

Dr. JOHN S. BILLINGS, U. S. A. . . . .	Washington, D. C.
Dr. SAMUEL W. ABBOTT . . . . .	Wakefield, Mass.
Dr. HENRY B. BAKER . . . . .	Lansing, Mich.

#### ON INCORPORATION.

Dr. GEORGE M. STERNBERG, <i>President</i> . . . . .	Baltimore, Md.
Dr. IRVING A. WATSON, <i>Secretary</i> . . . . .	Concord, N. H.
Dr. J. BERRIEN LINDSLEY, <i>Treasurer</i> . . . . .	Nashville, Tenn.
Dr. P. H. BAILHACHE, U. S. M. H. S. . . . .	Washington, D. C.
Dr. J. H. BAXTER, U. S. A. . . . .	Washington, D. C.
Medical Director JOHN M. BROWNE, U. S. N. . . . .	Washington, D. C.
Dr. SMITH TOWNSEND . . . . .	Washington, D. C.
SAMUEL A. ROBINSON, Esq. . . . .	Washington, D. C.



LIST OF PERSONS ELECTED TO MEMBERSHIP AT THE  
FOURTEENTH ANNUAL MEETING OF THE ASSOCIA-  
TION, HELD AT TORONTO, CANADA, OCT. 5-8, 1886.

ACTIVE.

Miss NELLIE S. ABBOTT, Clerk State Board of Health . . .	Concord, N. H.
Dr. ALFRED BENNISON ATHERTON, 509 Church St. . . .	Toronto, Ontario.
Dr. GEORGE BAIRD, President State Med. Soc. . . .	Wheeling, W. Va.
Dr. WILLIAM BAYARD, Chair. Bd. of Health .	City and County of St. John, N. B.
Dr. JOHN JAMES BERRY, City Physician and Member Local Board of Health . . . . .	Portsmouth, N. H.
ARCHIBALD BLUE, Asst. Com. Agriculture, 3 Linden St. . . .	Toronto, Can.
Dr. MATHIAS BOILEAU, Member Local Board of Health, Township of Cambridge . . . . .	Finch, Can.
Dr. WILLIAM H. BRAGDON, Chair. Local Bd. of Health .	North Conway, N. H.
Dr. J. R. BRATTON, Member State Board of Health . . .	Yorkville, S. C.
Dr. A. H. BRIGGS, Health Officer . . . . .	Buffalo, N. Y.
ALFRED EDMUND BURR, President State Board of Health .	Hartford, Conn.
Dr. PHILLIPS PALMER BURROWS, Medical Health Officer . .	Lindsay, Ont.
Dr. ALLAN CAMERON, Medical Health Officer . . . .	Owen Sound, Ont.
Dr. IRVING HOWARD CAMERON, 273 Sherburne St. . . . .	Toronto, Can.
Dr. SAMUEL P. CARBEE . . . . .	Haverhill, N. H.
GEORGE C. CARLISLE, Chair. Local Board of Health . .	St. Catharines, Can.
Dr. J. J. CASSIDY, Member Prov. Board of Health . . . .	Toronto, Can.
Dr. CHARLES V. CHAPIN, Superintendent of Health . . . .	Providence, R. I.
WALTER CLARK, Health Officer . . . . .	Guelph, Ont.
Dr. JAMES MILTON COLTON, Medical Health Officer . .	Lambton Mills, Ont.
Dr. JOHN COVENTRY, Medical Health Officer . . . . .	Windsor, Ont.
Dr. J. HARVEY CRAIG . . . . .	Mansfield, Ohio.
Dr. WILLIAM H. CRETCHER, Pres. State Board of Health .	Belfontaine, Ohio.
SAMUEL GEORGE CURRY, Architect . . . . .	Toronto, Ont.
Prof. W. W. DANIELLS, Member State Board of Health . .	Madison, Wis.
Dr. ALEXANDER DAVIDSON . . . . .	Toronto, Ont.
CHESTER B. DAVIS, C. E., Calumet Building . . . . .	Chicago, Ill.
Dr. WILLIAM SAWYER DENNETT, 31 W. 42d St. . . . .	New York city.
DAVID B. DICK, Architect, 17 Toronto St. . . . .	Toronto, Ont.
Dr. CHARLES S. ELLIOT . . . . .	Orillia, Ont.
Dr. W. HODGSON ELLIS, Professor of Chemistry, School of Practical Science . . . . .	Toronto, Ont.
Dr. DAVID ENGELMAN, Member State Board of Health . . .	Easton, Pa.
Dr. SIMEON A. EVANS . . . . .	Conway, N. H.
Dr. OSCAR FALLON FASSETT, Surgeon Central Vt. Railway .	St. Albans, Vt.
Dr. GEORGE E. FELL, Professor of Physiology, Niagara Uni- versity . . . . .	Buffalo, N. Y.
Dr. HADLEY B. FOWLER . . . . .	Bristol, N. H.
Dr. EDWIN MOTLEY FULLER . . . . .	Bath, Me.
Dr. R. S. GOODWIN, Member State Board of Health . . .	Thomaston, Conn.

Dr. CHARLES R. GOULD, Member Local Board of Health . . . . .	Tilton, N. H.
Dr. ELI EDWIN GRAVES . . . . .	Boscawen, N. H.
HENRY R. GRAY, Chairman Board of Health . . . . .	Montreal, Can.
Dr. JUST CHRISTIAN GRONVOLD, Member State Bd. of Health . . . . .	Norway, Minn.
Dr. EGERTON GRIFFIN, Medical Health Officer . . . . .	Brantford, Ont.
Dr. A. P. GRINNELL, Dean Medical Department, University of Vermont . . . . .	Burlington, Vt.
Dr. JOHN B. HAMILTON, Supervising Surgeon-General U. S. M. H. S. . . . .	Washington, D. C.
WILLIAM HAMILTON, Superintendent of Water-Works . . . . .	Toronto, Ont.
Dr. WILLIAM S. HARDING, Inspecting Physician, Port of St. John, N. B. . . . .	St. John, N. B.
Dr. THOMAS HILAND, Surgeon U. S. Navy (retired) . . . . .	Concord, N. H.
Dr. F. W. HUTCHINSON, 159 High St. . . . .	Providence, R. I.
Dr. WOODS HUTCHINSON, A. M., 335 Locust St. . . . .	Des Moines, Ia.
Dr. J. EARLE JENNER, Medical Health Officer . . . . .	Pictou, Ont.
NICHOLAS JONES, Member Local Board of Health, 2224 Car- son St. . . . .	Pittsburgh, Penn.
EDWARD C. JORDAN, C. E., Member State Board of Health, 184 Middle St. . . . .	Portland, Me.
Dr. GEORGE M. KIMBALL, 266 North Main St. . . . .	Concord, N. H.
Dr. LOUIS LABERGE, Medical Health Officer of Montreal, St. Catherine St. . . . .	Montreal, Que.
HENRY LANGLEY, Architect, Alexander St. . . . .	Toronto, Ont.
Prof. SAMUEL A. LATTIMORE, Prof. of Chemistry, Univer- sity of Rochester . . . . .	Rochester, N. Y.
Dr. JO H. LINSLEY, Health Officer . . . . .	Burlington, Vt.
HARVEY C. LOWRIE, C. E., City Engineer . . . . .	Denver, Col.
ALAN MACDOUGALL, Sanitary Engineer, Mail Building . . . . .	Toronto, Ont.
Dr. RICHARD LEA MACDONNELL, Professor of Hygiene, Mc- Gill College, Member Central Board of Health, Pro- vince of Quebec . . . . .	Montreal, Can.
Dr. DUNCAN MARQUIS, Medical Health Officer, Mohawk . . . . .	Ontarion, Can.
CHARLES D. MARX, C. E., Professor of Civil Engineering, Cornell University . . . . .	Ithaca, N. Y.
Dr. CHARLES McLELLAN, Medical Health Officer Trenton, Dundas St. . . . .	Trenton, Ont.
Dr. ALFRED MERCER, Com. N. Y. State Board of Health, 40 Montgomery St. . . . .	Syracuse, N. Y.
Dr. RICHARD BARRINGTON NEVITT, 164 Jarvis St. . . . .	Toronto, Ont.
Dr. J. FRED MOORE, Inspector Board of Health, 444 Pacific St. . . . .	Brooklyn, N. Y.
WILLIAM T. O'REILLY, Inspector of Prisons and Public Charities . . . . .	Toronto, Ont.
Dr. ANDREW OTTERSON, Health Commissioner, 179 Wash- ington St. . . . .	Brooklyn, N. Y.
Dr. JOHN H. PITMAN, Member Local Board of Health, North Conway, N. H. . . . .	Ottawa, Can.
Dr. EDWARD PLAYTER, Editor . . . . .	Ottawa, Can.
Dr. C. O. PROBST, Secretary State Board of Health, 600 North High St. . . . .	Columbus, Ohio.
Dr. ROBERT ALLAN PYNE, Jerrard St. E. . . . .	Toronto, Ont.
Dr. FRANCIS RAE, Member Prov. Board of Health, Ontario, Chairman Board of Health Ontario, King St. . . . .	Oshawa, Ont.

CHARLES GORDON RICHARDSON, Analyst, 126 Euclid Ave. . .	Toronto, Ont.
Dr. JOHN BINGHAM ROBERTS, A. M., Professor Anatomy and Surgery, Philadelphia Polyclinic, Surgeon to St. Mary's Hospital, Philadelphia, S. W. corner Walnut St. . .	Philadelphia, Penn.
Dr. A. ROBILLARD . . . . .	Ottawa, Ont.
Dr. THOMAS A. RODGER, Chief Surgeon G. T. R. Co., 12 Phillips Place . . . . .	Montreal, Can.
Dr. HENRY W. ROSE, Member State Board of Health, R. I., Supt. of Health town of Westerly, Briggs Building . .	Westerly, R. I.
Dr. GORDON WM. ALEX. ROSS, Medical Health Officer and Mortuary Statistical Officer, 9 Graham St. . . . .	Woodstock, Ont.
Dr. J. P. RUTHERFORD, Chairman Local Board of Health, Wellington, cor. Prince St. . . . .	Chatham, Ont.
Dr. ISAAC RYALL, Medical Health Officer . . . . .	Hamilton, Ont.
Dr. CHRISTOPHER SANBORN, . . . . .	Newport, N. H.
Dr. THOMAS B. SANBORN . . . . .	Newport, N. H.
Dr. W. J. SCOTT, Member Board of Health, 485 Prospect St.	Cleveland, Ohio.
Dr. GEORGE RUBENS SHEPHERD, Consulting Physician Conn. Mut. Life Ins. Co., 667 Asylum Ave. . . . .	Hartford, Conn.
Dr. JAMES SIMPSON, Member State Board of Health, 234 Post St. . . . .	San Francisco, Cal.
ANDREW SMITH, D. V. S., . . . . .	Toronto, Ont.
J. F. SPRINGFIELD, C. E. . . . .	Rochester, N. H.
Dr. WILLIAM ROBERT D. SUTHERLAND, Health Officer Man- itoba, 715 Main St. . . . .	Winnipeg, Man.
Dr. JOHN SWEETLAND . . . . .	Ottawa, Ont.
Dr. FREDERICK C. THAYER . . . . .	Waterville, Me.
Dr. JAMES THORBURN, 108 Wellington St. . . . .	Toronto, Ont.
Dr. ROBERT TRACY, Medical Health Officer and Statistical Officer for city of Bellville, Hotel St. . . . .	Bellville, Ont.
H. R. VAILLÉ, Chairman Board of Health . . . . .	Hinsdale, N. H.
Dr. WILLIAM NATHAN WICKWIRE, Inspecting Physician, Port of Halifax, 74 Morris St. . . . .	Halifax, N. S.
H. WILLIAMS, Chairman Local Board of Health . . . . .	Ottawa, Ont.
Dr. ALVERD E. WINCHELL, Member Board of Health, 6 Pearl St. . . . .	New Haven, Conn.
Dr. SIMEON P. WISE, Member State Board of Health . .	Millersburg, Ohio.
Dr. GEORGE WRIGHT, 243 Simcoe St. . . . .	Toronto, Ont.
Dr. H. P. YEOMANS, Member Provincial Board of Health .	Mt. Forest, Ont.

ASSOCIATE.

Mrs. LILLIE M. ALLEN, 802 West Monroe St. . . . .	Chicago, Ill.
Mrs. H. B. BAKER . . . . .	Lansing, Mich.
Mrs. EDWARD BAUSCH . . . . .	Rochester, N. Y.
Mrs. W. C. COOK . . . . .	Nashville, Tenn.
ROBERT EVANS, D. V. S. . . . .	Bolton, Ont.
Mrs. J. D. GATCH . . . . .	Lawrenceburg, Ind.
Mrs. CHARLES N. HEWITT . . . . .	Red Wing, Minn.
Mrs. EZRA M. HUNT . . . . .	Trenton, N. J.
MARK H. IRISH, Proprietor Rossin House . . . . .	Toronto, Ont.
Mrs. HOSMER A. JOHNSON . . . . .	Chicago, Ill.
Mrs. EMIL KUICHLING . . . . .	Rochester, N. Y.



Prof. D. S. KILLCUT, Professor Natural Science, President

Natural Science Association . . . . .	Buffalo, N. Y.
Mrs. C. A. LINDSLEY . . . . .	New Haven, Conn.
Miss CARRIE LINDSLEY . . . . .	New Haven, Conn.
JAMES GORDON MOWAT, Editor, 10 Robinson St. . . . .	Toronto, Ont.
Mrs. W. K. NEWTON . . . . .	Paterson, N. J.
HUDSON SAMSON, 6th Ave. . . . .	Pittsburgh, Penn.
Mrs. GEORGE M. STERNBERG . . . . .	Baltimore, Md.
Mrs. VICTOR C. VAUGHAN . . . . .	Ann Arbor, Mich.
Rev. SAMUEL S. WELLES, Chancellor of Victoria University . . . . .	Coburg, Ont.
Rev. JOSEPH WILD, M. A., D. D., 175 Jarvis St. . . . .	Toronto, Ont.
JAMES WILSON, Supt. Can. Pac. R. R., 110 King St. West . . . . .	Toronto, Ont.

#### HONORARY.

Dr. J. B. RUSSELL, LL.D., Medical Officer of Health . . Glasgow, Scotland.

# REVISED LIST OF MEMBERS AMERICAN PUBLIC HEALTH ASSOCIATION.

1887.

This list includes those who have maintained their membership to the present time, excepting those elected at Toronto, which will be found in another place. The Secretary should be notified of any errors or omissions.

## PRESIDENTS OF THE ASSOCIATION.

STEPHEN SMITH, M. D.	1872, '73, '74.
JOSEPH M. TONER, M. D.	1875.
EDWIN M. SNOW, M. D.	1876.
JOHN H. RAUCH, M. D.	1877.
*ELISHA HARRIS, M. D.	1878.
JAMES M. CABELL, M. D.	1879.
JOHN S. BILLINGS, M. D.	1880.
*CHARLES B. WHITE, M. D.	1881.
ROBERT C. KEDZIE, M. D.	1882.
EZRA M. HUNT, M. D.	1883.
ALBERT L. GIHON, M. D.	1884.
JAMES E. REEVES, M. D.	1885.
HENRY P. WALCOTT, M. D.	1886.
GEORGE M. STERNBERG, M. D.	1887.

## ACTIVE MEMBERS.

Dr. SAMUEL W. ABBOTT	Wakefield, Mass.	1882.
Dr. C. A. ABERNATHY	Pulaski, Tenn.	1880.
Dr. F. W. ACHILLES	Evansville, Ind.	1880.
Dr. C. G. ADAMS	Portland, Me.	1884.
Dr. CHARLES W. ADAMS	Kansas City, Mo.	1884.
Dr. J. F. A. ADAMS	Pittsfield, Mass.	1881.
Dr. CORNELIUS R. AGNEW	New York city.	1872.
J. K. ALLEN	Chicago, Ill.	1883.
Dr. M. K. ALLEN	Louisville, Ky.	1880.
Dr. NATHAN ALLEN	Lowell, Mass.	1873.
Dr. WILLIS G. ALLING	New Haven, Conn.	1885.
JAMES ALLISON	Cincinnati, O.	1884.
Dr. ADOLF ALT	St. Louis, Mo.	1884.
Dr. CHARLES AMBROOK	Boulder, Col.	1878.
Dr. AZEL AMES, Jr.	Wakefield, Mass.	1875.
Dr. W. N. AMES	Starkville, Miss.	1880.

\* Deceased.

Prof. EDMUND R. ANGELL . . . . .	Derry, N. H.	1884.
GEORGE T. ANGELL, Esq. . . . .	Boston, Mass.	1878.
Dr. S. T. ARMSTRONG, U. S. M. H. S. . . . .	Memphis, Tenn.	1882.
Dr. J. S. ARWINE . . . . .	Columbus, Ind.	1882.
Dr. W. J. ASDALE . . . . .	Pittsburgh, Penn.	1885.
Dr. G. C. ASHMUN . . . . .	Cleveland, Ohio.	1881.
Dr. LEGRAND ATWOOD . . . . .	St. Louis, Mo.	1884.
DECATUR AXTELL . . . . .	Richmond, Va.	1885.
Dr. WM. BAILEY . . . . .	Louisville, Ky.	1879.
Dr. PRESTON H. BAILHACHE, U. S. M. H. S. . . . .	Washington, D. C.	1874.
GEORGE W. BAIRD, U. S. N. . . . .	Washington, D. C.	1885.
Dr. HENRY B. BAKER . . . . .	Lansing, Mich.	1873.
Dr. M. C. BALDRIDGE . . . . .	Huntsville, Ala.	1878.
Dr. NAHUM E. BALLOU . . . . .	Sandwich, Ill.	1884.
ROBERT M. BARR . . . . .	Washington, D. C.	1885.
Dr. G. T. BARTLETT . . . . .	Poplar Bluff, Mo.	1884.
Dr. EDWIN J. BARTLETT . . . . .	Hanover, N. H.	1884.
Dr. T. G. BARNHILL . . . . .	Findley, Ohio.	1882.
Dr. I. M. H. BATEMAN . . . . .	Easton, Md.	1884.
Prof. G. BAUMGARTEN . . . . .	St. Louis, Mo.	1884.
EDWARD BAUSCH . . . . .	Rochester, N. Y.	1884.
Dr. J. H. BAXTER, U. S. A. . . . .	Washington, D. C.	1885.
WITTER J. BAXTER . . . . .	Janesville, Mich.	1882.
Dr. J. W. BAYNE . . . . .	Washington, D. C.	1885.
Dr. HENRY E. BEEBE . . . . .	Sidney, Ohio.	1882.
GEORGE N. BELL, C. E. . . . .	Newport, R. I.	1883.
Dr. A. NELSON BELL . . . . .	New York city.	1872.
Dr. A. C. BERNAYS . . . . .	St. Louis, Mo.	1884.
Rev. JOHN D. BEUGLESS, U. S. N. . . . .	Brooklyn, N. Y.	1884.
Dr. C. J. BICKHAM . . . . .	New Orleans, La.	1880.
Dr. JOHN S. BILLINGS, U. S. A. . . . .	Washington, D. C.	1872.
Gen. JAMES BINTLIFF . . . . .	Darlington, Wis.	1877.
Dr. EMILY BLACKWELL . . . . .	New York city.	1873.
E. W. BLATCHFORD, Esq. . . . .	Chicago, Ill.	1876.
Dr. D. W. BLISS . . . . .	Washington, D. C.	1885.
Dr. ARNIM F. BOCK . . . . .	St. Louis, Mo.	1884.
Dr. L. CHARLES BOISLINIÉRE . . . . .	St. Louis, Mo.	1884.
Dr. L. CHARLES BOISLINIÉRE, Jr. . . . .	St. Louis, Mo.	1884.
Dr. HENRY BONNABEL . . . . .	New Orleans, La.	1880.
Dr. HENRY I. BOWDITCH . . . . .	Boston, Mass.	1876.
F. N. BOXER, C. E. . . . .	Montreal, P. Q.	1885.
Dr. LOUIS BREMER . . . . .	St. Louis, Mo.	1884.
Dr. B. C. BRETT . . . . .	Green Bay, Wis.	1885.
Prof. WILLIAM H. BREWER . . . . .	New Haven, Conn.	1874.
Dr. CHARLES E. BRIGGS . . . . .	St. Louis, Mo.	1884.
Dr. DANIEL G. BRINTON . . . . .	Philadelphia, Penn.	1884.
Dr. BENJAMIN P. BRODIE . . . . .	Detroit, Mich.	1884.
Dr. WILLIAM BRODIE . . . . .	Detroit, Mich.	1873.
GLENN BROWN . . . . .	Washington, D. C.	1885.
G. P. BROWN . . . . .	Chicago, Ill.	1885.
Dr. M. R. BROWN . . . . .	Galveston, Texas.	1880.



Dr. JOHN M. BROWNE, U. S. N.	Washington, D. C.	1883.
Dr. J. H. BROWNFIELD	Fairmont, W. Va.	1885.
Dr. PETER H. BRYCE	Toronto, Can.	1883.
Hon. E. A. BURKE	New Orleans, La.	1880.
Dr. D. E. BURLINGAME	Elgin, Ill.	1884.
Dr. S. C. BUSEY	Washington, D. C.	1885.
Dr. LEWIS P. BUSH	Wilmington, Del.	1879.
Dr. JOHN S. BUTLER	Hartford, Conn.	1880.
Dr. J. GRATTAN CABELL	Richmond, Va.	1873.
Prof. JAMES L. CABELL	University of Virginia.	1872.
Dr. WM. CANNIFF	Toronto, Can.	1883.
Prof. HENRY F. CAMPBELL	Augusta, Ga.	1879.
Dr. JOHN CAMPBELL	Washington, D. C.	1885.
Dr. G. M. D. CANTRELL	Hope, Ark.	1881.
Dr. A. W. CANTWELL	Davenport, Ia.	1881.
H. N. CARGILL, Esq.	Grand Rapids, Mich.	1883.
Dr. ALFRED L. CARROLL	New Brighton, Staten Island, N. Y.	1883.
C. C. CARROLL, Jr.	St. Louis, Mo.	1882.
Dr. HENRY CARSE	Rock Island, Ill.	1880.
Dr. G. W. CARSON	St. Louis, Mo.	1884.
Prof. STANFORD E. CHAILLÉ	New Orleans, La.	1874.
Dr. WM. M. CHAMBERLAIN	New York city.	1885.
Dr. J. W. CHAMBERS	Baltimore, Md.	1884.
Dr. W. M. CHAMBERS	Charleston, Ill.	1877.
Dr. C. W. CHANCELLOR	Baltimore, Md.	1875.
Dr. C. F. CHANDLER	New York city.	1872.
Dr. JEROME COCHRAN	Mobile, Ala.	1878.
Dr. BELA COGSHALL	Flint, Mich.	1879.
Dr. C. G. COMEGYS	Cincinnati, Ohio.	1884.
Dr. T. GRISWOLD COMSTOCK	St. Louis, Mo.	1884.
Dr. J. W. COMPTON	Evansville, Ind.	1879.
Dr. W. B. CONERY	St. Louis, Mo.	1882.
Dr. GRANVILLE P. CONN	Concord, N. H.	1875.
Prof. PHINEAS S. CONNER	Cincinnati, Ohio.	1884.
Dr. LEARTUS CONNOR	Detroit, Mich.	1883.
Dr. GEORGE COOK	Concord, N. H.	1885.
Dr. W. C. COOK	Nashville, Tenn.	1884.
Rev. WM. COOK	Wheeling, W. Va.	1885.
Hon. W. F. COOPER	Nashville, Tenn.	1884.
JOHN P. CORCORAN	Linden, Mich.	1883.
Prof. H. B. CORNWALL	Princeton, N. J.	1884.
Dr. CHARLES WM. COVERNTON	Toronto, Can.	1884.
Dr. T. S. COVERNTON	Toronto, Can.	1885.
Dr. GEORGE M. COX	Springfield, Mo.	1884.
Dr. G. G. CRAIG	Rock Island, Ill.	1880.
Dr. J. W. CRAIG	Mansfield, Ohio.	1884.
Dr. S. C. CRAVENS	Bloomfield, Ind.	1882.
J. JAMES R. CROES, C. E.	Yonkers, N. Y.	1877.
S. W. CUMMINGS	St. Albans, Vt.	1885.
Dr. DAVID M. CURRIER	Newport, N. H.	1883.
Prof. F. C. CURTIS	Albany, N. Y.	1883.

Prof. CHARLES O. CURTMAN . . . . .	St. Louis, Mo.	1884.
Dr. JACOB M. DACOSTA . . . . .	Philadelphia, Penn.	1874.
Dr. J. P. DAKE . . . . .	Nashville, Tenn.	1879.
Dr. N. PENDLETON DANDRIDGE . . . . .	Cincinnati, Ohio.	1884.
Dr. F. E. DANIEL . . . . .	Austin, Texas.	1880.
Dr. H. H. DARR . . . . .	Caldwell, Texas.	1883.
Dr. JAMES DARRACH . . . . .	Germantown, Penn.	1874.
Dr. BENNETT F. DAVENPORT . . . . .	Boston, Mass.	1884.
Dr. WILLIAM B. DAVIS . . . . .	Cincinnati, Ohio.	1884.
Dr. WALTER DEFOREST DAY . . . . .	New York city.	1873.
Dr. D. V. DEAN . . . . .	St. Louis, Mo.	1880.
Dr. F. F. DEDECKY . . . . .	Sacramento, Cal.	1882.
Dr. GIOVANNI DEL ORTO . . . . .	New Orleans, La.	1880.
Dr. LABAN DENNIS . . . . .	Newark, N. J.	1877.
Dr. JOHN W. DETWILLER . . . . .	Bethlehem, Penn.	1882.
Dr. GUSTAVUS DEVRON . . . . .	New Orleans, La.	1878.
Dr. OSCAR C. DEWOLF . . . . .	Chicago, Ill.	1880.
CHAS. C. DEWSTOE . . . . .	Cleveland, Ohio.	1885.
Dr. W. H. DICKERSON . . . . .	Des Moines, Ia.	1881.
Hon. PEREZ DICKINSON . . . . .	Knoxville, Tenn.	1881.
Dr. WILLIAM DICKINSON . . . . .	St. Louis, Mo.	1884.
WM. S. DISBROW . . . . .	Newark, N. J.	1885.
Dr. C. E. DIVEN . . . . .	Anderson, Ind.	1884.
WILLIAM E. DODGE, Jr. . . . .	New York city.	1874.
Prof. FRANK DONALDSON . . . . .	Baltimore, Md.	1875.
Dr. G. A. DOREN . . . . .	Columbus, Ohio.	1885.
Dr. ABRAM DUBOIS . . . . .	New York city.	1874.
Dr. PEMBERTON DUDLEY . . . . .	Philadelphia, Penn.	1885.
Dr. JOHN E. DUFFEL . . . . .	Donaldsonville, La.	1880.
Dr. JOHN A. DULANEY . . . . .	Covington, Ky.	1884.
Dr. T. C. DUNCAN . . . . .	Chicago, Ill.	1880.
Dr. J. C. DUNN . . . . .	Pittsburgh, Penn.	1885.
Dr. H. C. DUNNAVANT . . . . .	Osceola, Ark.	1882.
Dr. F. A. DUNSMORE . . . . .	Minneapolis, Minn.	1885.
WILLIAM P. DUNWOODY . . . . .	Washington, D. C.	1884.
Dr. SAMUEL H. DURGIN . . . . .	Boston, Mass.	1875.
Dr. O. R. EARLY . . . . .	Columbus, Ky.	1879.
Prof. L. EDDY . . . . .	Danville, Ky.	1884.
Dr. FRED EDMISTER . . . . .	S. Brooklyn, N. Y.	1885.
Dr. JOSEPH F. EDWARDS . . . . .	Philadelphia, Penn.	1884.
Dr. E. R. EGGLESTON . . . . .	Mt. Vernon, Ohio.	1882.
Dr. E. S. ELDER . . . . .	Indianapolis, Ind.	1882.
Dr. LLEWELLYN ELIOT . . . . .	Washington, D. C.	1885.
Dr. JOHN B. ELLIOTT . . . . .	Sewanee, Tenn.	1880.
Dr. WILLIAM H. ELLIOTT . . . . .	Savannah, Ga.	1878.
Dr. GEORGE J. ENGELMANN . . . . .	St. Louis, Mo.	1884.
Dr. D. C. ENGLISH . . . . .	New Brunswick, N. J.	1882.
Dr. GEORGE ENGS . . . . .	Newport, R. I.	1876.
Dr. S. T. EVANS . . . . .	Union City, Tenn.	1880.
Dr. WILLIAM J. EVANS . . . . .	New York city.	1884.
Dr. HENRY C. FAIRBANK . . . . .	Flint, Mich.	1880.

Dr. L. A. FALLIGANT . . . . .	Savannah, Ga.	1881.
J. T. FANNING, C. E. . . . .	Manchester, N. H.	1884.
A. B. FARQUHAR, Esq. . . . .	York, Penn.	1880.
Dr. CHARLES FARQUHAR . . . . .	Olney, Md.	1885.
Dr. JOHN FEE . . . . .	Kansas City, Mo.	1884.
EDWARD FENNER, Esq. . . . .	New Orleans, La.	1879.
Dr. THOMAS H. FENTON . . . . .	Philadelphia, Penn.	1884.
Dr. C. S. D. FESSENDEN, U. S. M. H. S. . . . .	St. Louis, Mo.	1884.
Dr. J. D. FIELDS . . . . .	Manor, Texas.	1880.
Dr. N. FIELDS . . . . .	Jeffersonville, Ind.	1884.
Dr. W. E. FISCHER . . . . .	St. Louis, Mo.	1884.
Dr. CHAS. H. FISHER . . . . .	Providence, R. I.	1881.
L. C. FISHER, Esq. . . . .	Galveston, Texas.	1878.
JAMES FLEMMING, Esq. . . . .	Jersey City, N. J.	1885.
Dr. GEORGE W. FOOTE . . . . .	Galesburg Ill.	1877.
Prof. CORYDON L. FORD . . . . .	Ann Arbor, Mich.	1872.
Dr. WILLIAM H. FORD . . . . .	Philadelphia, Penn.	1874.
Dr. FELIX FORMENTO . . . . .	New Orleans, La.	1880.
Dr. EUGENE FOSTER . . . . .	Augusta, Ga.	1881.
Dr. H. D. FRASER . . . . .	Charleston, S. C.	1880.
Dr. SPENCER M. FREE . . . . .	Baltimore, Md.	1885.
Dr. WILLIAM FREEMAN . . . . .	Vevay, Ind.	1884.
Dr. A. G. FRIEDRICHS . . . . .	New Orleans, La.	1880.
Dr. FRANK R. FRY . . . . .	St. Louis, Mo.	1884.
Dr. ROBERT M. FUNKHOUSER . . . . .	St. Louis, Mo.	1884.
Prof. JAMES T. GARDNER . . . . .	Albany, N. Y.	1875.
Dr. J. D. GATCH . . . . .	Lawrenceburg, Ind.	1879.
FRANKLIN GAUNTT . . . . .	Burlington, N. J.	1885.
WILLIAM PAUL GERHARD, C. E. . . . .	New York city.	1880.
Dr. E. W. GERMER . . . . .	Erie, Penn.	1885.
Dr. FREDERIC H. GERRISH . . . . .	Portland, Me.	1885.
Dr. WOLCOTT GIBBS . . . . .	Cambridge, Mass.	1876.
Dr. ALBERT L. GIHON, U. S. N. . . . .	Mare Island, Cal.	1876.
Dr. JOHN E. GILMAN . . . . .	Chicago, Ill.	1885.
Dr. ALFRED C. GIRARD, U. S. A. . . . .	Boisé Barracks, Idaho.	1874.
Dr. A. H. GLENNAN, U. S. M. H. S. . . . .	Key West, Fla.	1885.
Dr. W. W. GODDING . . . . .	Washington, D. C.	1885.
Dr. EDMUND K. GOLDSBOROUGH . . . . .	Washington, D. C.	1885.
Dr. ALBERT C. GORGAS, U. S. N. . . . .	Philadelphia, Penn.	1881.
W. H. GRAHAM . . . . .	St. Louis, Mo.	1884.
Dr. GABRIEL GRANT . . . . .	New York city.	1873.
CROSBY GRAY, Esq. . . . .	Pittsburgh, Penn.	1874.
Dr. Wm. M. GRAY . . . . .	Washington, D. C.	1885.
Dr. JOHN GREEN . . . . .	St. Louis, Mo.	1884.
Dr. JOHN J. GREEN . . . . .	Pittsburgh, Penn.	1884.
Gen. COLTON GREENE . . . . .	Memphis, Tenn.	1880.
Dr. E. H. GREGORY . . . . .	St. Louis, Mo.	1884.
Dr. B. M. GRIFFITH . . . . .	Springfield, Ill.	1880.
Dr. RICHARD GUNDRY . . . . .	Catonsville, Md.	1885.
Hon. D. P. HADDEN . . . . .	Memphis, Tenn.	1880.
Dr. DANIEL R. HAGNER . . . . .	Washington, D. C.	1885.



Hon. WILLIAM H. HALCOMBE . . . . .	New Orleans, La.	1880.
Dr. CHARLES H. H. HALL . . . . .	Washington, D. C.	1884.
Dr. JUNIUS M. HALL . . . . .	Chicago, Ill.	1880.
Dr. WILLIS HALL . . . . .	St. Louis, Mo.	1884.
Prof. G. HAMBACH . . . . .	St. Louis, Mo.	1884.
J. J. HAMLIN . . . . .	Chicago, Ill.	1884.
Dr. T. E. HAMMOND . . . . .	Washington, D. C.	1885.
Dr. D. W. HAND . . . . .	St. Paul, Minn.	1878.
ED. J. HANNAN . . . . .	Washington, D. C.	1885.
Dr. W. A. HARDAWAY . . . . .	St. Louis, Mo.	1884.
Dr. R. A. HARDIN . . . . .	Nashville, Tenn.	1879.
Dr. M. H. HARDING . . . . .	Lawrenceburg, Ind.	1884.
WM. HARE . . . . .	Wheeling, W. Va.	1885.
Dr. ROBERT B. S. HARGIS . . . . .	Pensacola, Fla.	1878.
Dr. CHARLES HARRINGTON . . . . .	Boston, Mass.	1884.
Dr. T. A. HARRIS . . . . .	Parkersburg, W. Va.	1884.
Dr. W. J. HARRIS . . . . .	St. Louis, Mo.	1884.
Prof. JAMES F. HARRISON . . . . .	University of Virginia.	1878.
CHARLES B. HART . . . . .	Wheeling, W. Va.	1885.
Dr. J. F. HARTIGAN . . . . .	Washington, D. C.	1885.
Dr. HENRY HARTSHORNE . . . . .	Philadelphia, Penn.	1872.
Dr. EDWARD M. HARTWELL . . . . .	Baltimore, Md.	1884.
THOMAS HARVEY . . . . .	Chicago, Ill.	1884.
Dr. W. A. HASKELL . . . . .	Alton, Ill.	1883.
Dr. THOMAS HAY . . . . .	Philadelphia, Penn.	1874.
Dr. ARTHUR HAZLEWOOD . . . . .	Grand Rapids, Mich.	1883.
Dr. J. C. HEARNE . . . . .	Hannibal, Mo.	1884.
Dr. HENRY F. HEREFORD . . . . .	Kansas City, Mo.	1884.
RUDOLPH HERING, C. E. . . . .	Philadelphia, Penn.	1878.
Dr. J. H. HERMANN . . . . .	St. Louis, Mo.	1884.
Dr. CUMBERLAND G. HERNDON, U. S. N. . . . .	Washington, D. C.	1884.
Dr. H. J. HERRICK . . . . .	Cleveland, Ohio.	1882.
Dr. S. S. HERRICK . . . . .	New Orleans, La.	1878.
Dr. G. D. HERSEY . . . . .	Providence, R. I.	1885.
Prof. CHARLES N. HEWITT . . . . .	Red Wing, Minn.	1872.
Dr. D. C. HEWSON . . . . .	Orange, Texas.	1880.
Dr. JAMES F. HIBBERD . . . . .	Richmond, Ind.	1881.
Dr. D. B. HILLIS . . . . .	Keokuk, Ia.	1880.
Dr. ALFRED HILLS . . . . .	New York city.	1885.
Dr. WM. H. HINGSTON . . . . .	Montreal, P. Q.	1885.
Prof. EDWARD HITCHCOCK . . . . .	Amherst, Mass.	1877.
E. J. HODGSON, Esq. . . . .	St. Paul, Minn.	1884.
Dr. KNUT HOEGH . . . . .	La Crosse, Wis.	1882.
Dr. J. R. HOFFMAN . . . . .	Athens, Ala.	1884.
Dr. T. E. HOLLAND . . . . .	St. Louis, Mo.	1884.
Dr. ALFRED F. HOLT . . . . .	Cambridge, Mass.	1885.
Dr. JOSEPH HOLT . . . . .	New Orleans, La.	1880.
Hon. HENRY D. HOLTON . . . . .	Brattleborough, Vt.	1875.
Dr. GEORGE HOMAN . . . . .	St. Louis, Mo.	1879.
Prof. P. O. HOOPER . . . . .	Little Rock, Ark.	1884.
Dr. HENRY B. HORLBECK . . . . .	Charleston, S. C.	1880.

Dr. ASA HERR	Dubuque, Ia.	1872.
Dr. O. A. HERR	Lewiston, Me.	1885.
Dr. CARL H. HORSCH	Dover, N. H.	1885.
Dr. GEORGE HOWE	Columbia, S. C.	1884.
Dr. HENRY F. HOYT	St. Paul, Minn.	1884.
Dr. ADRIAN HUDSON, U. S. N.	Washington, D. C.	1882.
Dr. EZRA M. HUNT	Trenton, N. J.	1872.
Dr. C. L. HUNT	Parkersburgh, W. Va.	1885.
Dr. HENRY M. HURD	Pontiac, Mich.	1883.
ELIAS S. HUTCHINSON	Washington, D. C.	1885.
Dr. ANDREW W. IMERIE	Detroit, Mich.	1885.
Dr. J. W. JACKSON	Kansas City, Mo.	1884.
Rev. D. C. JACOKES, S. T. D.	Pontiac, Mich.	1882.
Dr. BUSHROD W. JAMES	Philadelphia, Penn.	1878.
Dr. EDWARD H. JAMES	New York city.	1872.
Dr. ANDREW J. B. JENNER	Detroit, Mich.	1883.
Prof. HOSMER A. JOHNSON	Chicago, Ill.	1872.
Dr. SAM C. JOHNSON	Hudson, Wis.	1884.
Dr. E. UTLEE JONES	Taunton, Mass.	1881.
Dr. H. ISAAC JONES	Scranton, Penn.	1880.
Dr. J. W. JONES	Tarborough, N. C.	1885.
Dr. TALBOT JONES	St. Paul, Minn.	1885.
C. KALLOCK	Cheraw, S. C.	1884.
Hon. J. M. KEATING	Memphis, Tenn.	1880.
Prof. ROBERT C. KEDZIE	Lansing, Mich.	1873.
Dr. J. H. KELLOGG	Battle Creek, Mich.	1878.
Dr. J. F. KENNEDY	Des Moines, Ia.	1885.
Dr. J. H. KIDDER	Washington, D. C.	1885.
Dr. A. R. KILPATRICK	Navasota, Texas.	1880.
FRANCIS T. KING	Baltimore, Md.	1875.
Dr. J. P. KINGSLEY	St. Louis, Mo.	1884.
Dr. H. W. KITCHEN	Cleveland, Ohio.	1881.
Dr. CHARLES F. KLAYER	Cincinnati, Ohio.	1881.
Dr. C. H. A. KLEINSCHMIDT	Washington, D. C.	1885.
Dr. CHARLES KNAPP	Evansville, Ind.	1884.
Dr. A. Z. KOINER	Roanoke, Va.	1885.
Dr. ISAAC N. KORLIN	Elwyn, Penn.	1874.
Dr. GEORGE N. KREIDER	Springfield, Ill.	1884.
EMIL KUICHLING, C. E.	Rochester, N. Y.	1882.
JOHN D. LADDEN, Esq.	St. Paul, Minn.	1885.
Dr. J. W. LAMBERT	St. Louis, Mo.	1885.
Prof. JAMES LAW	Ithaca, N. Y.	1872.
Dr. SAMUEL W. LATTI	Philadelphia, Penn.	1885.
Dr. THOMAS LAYTON	New Orleans, La.	1880.
Dr. H. E. LEACH	Washington, D. C.	1885.
Dr. ROBERT LEBBY	Charleston, S. C.	1878.
Dr. BENJAMIN LEE	Philadelphia, Penn.	1874.
Dr. WILLIAM LEE	Washington, D. C.	1874.
Prof. HENRY LEFFMANN	Philadelphia, Penn.	1884.
L. Z. LEITER, Esq.	Chicago, Ill.	1876.
Dr. B. B. LENOIR	Lenoir's, Tenn.	1879.
Dr. B. F. LEONARD	Baltimore, Md.	1884.
Dr. WILLIAM H. LEONARD	Minneapolis, Minn.	1882.

Dr. T. B. LESTER . . . . .	Kansas City, Mo.	1884.
Dr. JAMES H. LETCHER . . . . .	Henderson, Ky.	1880.
WILLIAM P. LETCHWORTH, Esq. . . . .	Glen Iris, N. Y.	1874.
Prof. GEORGE W. LETTERMAN . . . . .	Allenton, Mo.	1884.
Dr. H. H. LEVY . . . . .	Richmond, Va.	1878.
Dr. EUGENE R. LEWIS . . . . .	Kansas City, Mo.	1884.
Dr. FRANCIS W. LEWIS . . . . .	Philadelphia, Penn.	1874.
Prof. A. LIAUTARD . . . . .	New York city.	1872.
Dr. N. S. LINCOLN . . . . .	Washington, D. C.	1885.
Prof. C. A. LINDSLEY . . . . .	New Haven, Conn.	1875.
Dr. J. BERRIEN LINDSLEY . . . . .	Nashville, Tenn.	1877.
Dr. J. M. LINDSLEY . . . . .	Pecan Point, Ark.	1879.
Dr. J. E. LINK . . . . .	Terre Haute, Ind.	1882.
Dr. FREDERICH LOEBER . . . . .	New Orleans, La.	1880.
Dr. WILLIAM LOMAX . . . . .	Marion, Ind.	1882.
Dr. ISAAC N. LOVE . . . . .	St. Louis, Mo.	1884.
Dr. ROBERT LUEDEKING . . . . .	St. Louis, Mo.	1880.
Dr. C. J. LUNDY . . . . .	Detroit, Mich.	1883.
Dr. J. L. LYONS . . . . .	New Orleans, La.	1880.
Dr. T. L. MADDEN . . . . .	Nashville, Tenn.	1879.
Dr. LOUIS MACKALL . . . . .	Washington, D. C.	1885.
Dr. HENRY O. MARCY . . . . .	Boston, Mass.	1883.
Dr. SOLON MARKS . . . . .	Milwaukee, Wis.	1876.
Dr. ROBERT MARTIN . . . . .	Milwaukee, Wis.	1885.
Dr. E. J. MARSH . . . . .	Paterson, N. J.	1872.
Dr. JNO. EDWIN MASON . . . . .	Manchester, N. H.	1885.
Dr. J. S. MAVITY . . . . .	Fowler, Ind.	1882.
Dr. J. FREDERICK MAY . . . . .	Washington, D. C.	1885.
Hon. WILLIAM McADOO, M. C. . . . .	Jersey City, N. J.	1885.
Dr. J. H. McCLELLAND . . . . .	Pittsburgh, Penn.	1885.
Dr. JAMES McCLURE . . . . .	St. Louis, Mo.	1884.
Dr. JOHN H. MCCOLLOM . . . . .	Boston, Mass.	1884.
Dr. J. N. McCORMACK . . . . .	Bowling Green, Ky.	1880.
Dr. W. P. McINTOSH, U. S. M. H. S. . . . .	New Orleans, La.	1885.
CHARLES McMILLAN . . . . .	Washington, D. C.	1885.
Hon. ALBERT T. McNEAL . . . . .	Bolivar, Tenn.	1879.
Dr. JOHN A. MEAD . . . . .	Pearlington, Miss.	1880.
Dr. A. H. MEISSENBAUGH . . . . .	St. Louis, Mo.	1884.
Hon. GEORGE A. MERCER . . . . .	Savannah, Ga.	1881.
Dr. ALBERT MERRELL . . . . .	St. Louis, Mo.	1884.
Dr. CHARLES N. METCALF . . . . .	Indianapolis, Ind.	1885.
Maj. E. T. D. MEYERS . . . . .	Richmond, Va.	1885.
HENRY C. MEYER, C. E. . . . .	New York city.	1882.
Prof. W. D. MIDDLETON . . . . .	Davenport, Ia.	1885.
Dr. JOHN J. MILHAU . . . . .	New York city.	1873.
Dr. CHAS. W. MILLAN . . . . .	Washington, D. C.	1885.
Prof. PERRY H. MILLARD . . . . .	Stillwater, Minn.	1884.
Dr. J. L. MILLION . . . . .	Springfield, Ill.	1880.
Dr. HIRAM R. MILLS . . . . .	Chicago, Ill.	1882.
Prof. JOHN B. MINOR . . . . .	University of Virginia, Va.	1878.
Dr. CHARLES MITCHELL . . . . .	Nashville, Tenn.	1884.
Dr. HENRY MITCHELL . . . . .	Asbury Park, N. J.	1885.



Dr. EZRA MITCHELL . . . . .	Lancaster, N. H.	1884.
Dr. R. W. MITCHELL . . . . .	Memphis, Tenn.	1878.
Dr. L. H. MONTGOMERY . . . . .	Chicago, Ill.	1879.
Dr. F. MONTIZAMBERT . . . . .	Quebec, P. Q.	1885.
Dr. E. M. MOORE . . . . .	Rochester, N. Y.	1881.
ROBERT MOORE, C. E. . . . .	St. Louis, Mo.	1880.
Dr. S. P. MOORE . . . . .	Richmond, Va.	1878.
Dr. J. E. MORGAN . . . . .	Washington, D. C.	1885.
DAVID PERCY MORGAN, Jr. . . . .	Washington, D. C.	1885.
Dr. J. CHESTON MORRIS . . . . .	Philadelphia, Penn.	1883.
Dr. JOHN MORRIS . . . . .	Baltimore, Md.	1874.
MARTIN MOYLAN . . . . .	Chicago, Ill.	1884.
Prof. HENRY H. MUDD . . . . .	St. Louis, Mo.	1882.
Prof. CHARLES E. MUNROE, U. S. N. A. . . . .	Annapolis, Md.	1876.
EDWARD MURPHY . . . . .	Chicago, Ill.	1884.
Dr. JOHN C. MURPHY . . . . .	Cincinnati, Ohio.	1884.
Dr. P. J. MURPHY . . . . .	Washington, D. C.	1885.
A. W. MURRAY . . . . .	Chicago, Ill.	1884.
Dr. ROBERT D. MURRAY, U. S. M. H. S. . . . .	Biloxi, Miss.	1872.
Dr. JOHN T. NAGLE . . . . .	New York city.	1874.
Dr. HERBERT M. NASH . . . . .	Norfolk, Va.	1878.
Dr. RICHARD A. NEALE . . . . .	Washington, D. C.	1885.
J. CRAWFORD NEILSON, C. E. . . . .	Baltimore, Md.	1884.
Dr. E. M. NELSON . . . . .	St. Louis, Mo.	1884.
Dr. W. H. NEWELL . . . . .	Jersey City, N. J.	1882.
Dr. WILLIAM K. NEWTON . . . . .	Paterson, N. J.	1883.
Dr. C. B. NICHOLS . . . . .	Franklin Falls, N. H.	1885.
Dr. EDGAR H. NICHOLS, U. S. M. H. S. . . . .	Savannah, Ga.	1882.
Dr. F. G. NICHOLSON . . . . .	Del Rio, Texas.	1881.
F. A. NIMS, Esq. . . . .	Muskegon, Mich.	1883.
Dr. J. B. W. NOWLIN . . . . .	Nashville, Tenn.	1879.
Dr. R. J. NUNN . . . . .	Savannah, Ga.	1881.
Dr. J. J. O'CONNOR . . . . .	Holyoke, Mass.	1885.
Dr. WILLIAM OLDRIGHT . . . . .	Toronto, Can.	1883.
FRED LAW OLNSTEAD . . . . .	Brookline, Mass.	1872.
Dr. H. S. ORME . . . . .	Los Angeles, Cal.	1885.
Dr. P. S. O'REILLY . . . . .	St. Louis, Mo.	1884.
Prof. EDWARD ORTON . . . . .	Columbus, Ohio.	1874.
Dr. W. B. OUTTEN . . . . .	St. Louis, Mo.	1884.
FREDERICK N. OWEN, C. E. . . . .	New York city.	1883.
Prof. A. B. PALMER . . . . .	Ann Arbor, Mich.	1883.
Dr. W. THORNTON PARKER, U. S. A. . . . .	Newport, R. I.	1884.
Dr. J. M. PARTRIDGE . . . . .	South Bend, Ind.	1881.
Dr. DEWITT C. PATTERSON . . . . .	Washington, D. C.	1884.
HENRY E. PELLEW, Esq. . . . .	Washington, D. C.	1876.
Maj. GREEN PEYTON . . . . .	University of Virginia.	1878.
Dr. D. L. PHAREZ . . . . .	Agricultural College, Miss.	1880.
Dr. J. D. PLUNKET . . . . .	Nashville, Tenn.	1878.
Dr. W. P. POWELL . . . . .	Willis, Texas.	1880.
Dr. FOSTER PRATT . . . . .	Kalamazoo, Mich.	1882.
Dr. C. N. PRESTON . . . . .	Davenport, Ia.	1885.

Prof. T. F. PREWITT . . . . .	St. Louis, Mo.	1884.
Dr. WM. R. PRIME . . . . .	Richford, Vt.	1885.
Dr. DAVID PRINCE . . . . .	Jacksonville, Ill.	1880.
J. C. PUMPELTY . . . . .	Morristown, N. J.	1885.
Dr. J. N. QUIMBY . . . . .	Jersey City, N. J.	1884.
Dr. T. N. QUIMBY . . . . .	Minneapolis, Minn.	1885.
Dr. GEORGE E. RANNEY . . . . .	Lansing, Mich.	1880.
Dr. JOHN H. RAUCH . . . . .	Springfield, Ill.	1872.
Dr. JOSEPH H. RAYMOND . . . . .	Brooklyn, N. Y.	1882.
Dr. R. HARVEY REED . . . . .	Mansfield, Ohio.	1884.
Dr. J. T. REEVE . . . . .	Appleton, Wis.	1876.
Dr. JAMES E. REEVES . . . . .	Wheeling, W. Va.	1872.
Dr. FRANK W. REILLY . . . . .	Springfield, Ill.	1874.
Dr. CHARLES REISS . . . . .	Washington, Mo.	1884.
Dr. B. O. REYNOLDS . . . . .	Lake Geneva, Wis.	1884.
Dr. ALBERT R. RICE . . . . .	Springfield, Mass.	1884.
Dr. C. T. RICHARDSON . . . . .	Charleston, W. Va.	1881.
Dr. DWIGHT A. RICHARDSON . . . . .	Osceola, Ark.	1885.
HENRY B. RICHARDSON, C. E. . . . .	New Orleans, La.	1880.
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